HISTORICAL NOTES
ON
SHIPPING

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BY

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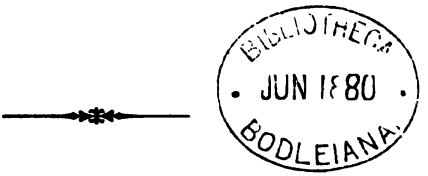

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PREFACE.

A PORTION of the following "Historical Notes on Shipping" was written as a Lecture for, and delivered at, the "Jewish Working Men's Club and Institute." It occurred to the writer that there was, to his knowledge, no concise account of the most important historical events in connection with ships and shipbuilding, which would be generally interesting, and perhaps instructive, to youth. Therefore, he decided to extend the papers into a small work, and put it before the Public.

A second Lecture, including some of the latter part of this book, has been written for the "Selhurst Road Congregational Church Literary Society."

The historical matter is taken from the late Mr. W. S. Lindsay's exhaustive work, of four volumes, entitled, "History of Ancient and Modern Merchant Shipping"; from various other authorities, research among original records, and extracts from "The Times."

HISTORICAL NOTES ON SHIPPING.

CHAPTER I.

IN attempting to treat on such a large subject, this account will be necessarily a sketch, just touching upon various points from ancient to modern times, that it may be presented in such a way as to be conducive to thought, whereby information may be gained upon a subject, in which all have the greatest and most important interests.

To some it might be an incentive to enter into the profession of a naval architect, which, up to the present time, few have joined.

It is not from an over-enthusiastic feeling, that it is confidently asserted that there is no other branch of science and art combined, which has influenced the civilisation and benefited the world so much as shipping and its workings. In one of the Acts of Parliament * on shipping, it says, "The Royal and "Mercantile Navy, whereon, under the good pro- "vidence of God, the wealth, safety, and strength of "the Kingdom chiefly depend."

Therefore, commencing with the feelings and ideas that must almost follow, as a matter of course, from

* 29 & 30 Vic., cap. cix.

an occupation in which one can see high aims and ennobling influences, it may be claimed for the Hebrews that they had a more direct connection with shipping in ancient times, than writers seem inclined to give; the more remote the times, the more uncertain are the data from which to draw inferences; but this fact is noticeable, that, whereas from slight data writers have come to positive conclusions, on similar data, the connection of the Hebrews with shipping and navigation has been negatived. The fact is, that writers never cared nor wished to attach the words Hebrew and Jewish to anything that had a noble or direct influence on the world. The Hebrew race may claim the first vessel recorded in any history, viz., the Ark. Here we have a ship actually preserving the people, and the consequent civilisation of the world. This event is set down in the year 2348 B.C.E. The dimensions are said to have been, length 450 feet, breadth 75 feet, depth 45 feet,* giving a register tonnage, according to the present mode of calculation, of 15,000 tons, which is less than the steamship "Great Eastern."

To a boat Moses' preservation may be attributed; and here, again, we owe to a boat the whole moral government of the world. This Ark, or Vessel, was made of plaited bulrushes,† coated with slime and

* Cubit = 18 inches.

† Isaiah xviii. 1, 2.—"Woe to the land which, under the shadow of sails, doth sail beyond the rivers of Ethiopia, by whom are sent ambassadors in ships of bulrushes" (such as the Ethiopians use, commonly called almadiæ).—*Vide* Manasseh Ben Israel's "Hope of Israel," sect. xviii., referring to a nation of Israelites spoken of as living "near the head of the Nilus," lately known to the world as the Falashas.

pitch, the pitch being bitumen, which was before this time, 1571 B.C., imported from Babylonia into Egypt.* The Ancient British coracle, still used in South Wales, was similar to the boat that preserved Moses.

The Phœnicians, who are vaguely said to have originally come from the borders of the Persian Gulf, to the coast of the Mediterranean, have the credit (from remotest times to almost the period of the destruction of Tyre, Sidon and Carthage) of being the greatest, if not the only maritime people. Mr. Lindsay, in his elaborate work, says, "That the Jews owe their first knowledge of the "result of successful commerce to David, though "not from legitimate trade, but from the plundering "of his neighbours, the Philistines, who were the "Phœnicians, and others." This statement, being the latest, may be taken as a fair instance of what has just been mentioned as to writers and their inferences, as to judge by evidence taken from the Bible;† for instance, the so-called Phœnicians included as many Hebrews as Philistines. Jacob in his blessing says, "*Z*ebulun shall dwell at the haven "of ships, and his border shall be unto *Z*idon." In Numbers, chap. xxiv., it speaks of ships to come from the coast of Chittim. In Deut. xxxiii. 22 it says, "Dan is a lion's whelp, and he shall leap out

* See "Assyrian Antiquities," p. 9.

† Numbers ii. 25, xxiv., "Ships from Chittim." Josh. ii. 1, "Shittim." Numbers xxxiii. 48, 49; Josh. i. 4, "The Great Sea." Numbers xxxi. 33, xxxii.; Josh. ix. 10, x. 5, xii. 4, "Bashan." Josh. xi. 8, "Great Zidon."

" of Bashan"; the kingdom of Bashan bordered on the Mediterranean. In Joshua xi. 8 it says that Israel chased the five kings unto Great *Z*idon. The land taken by the tribe of *Z*ebulun is described as towards the sea.* "The land of the tribe of Asher " reached to *Z*idon and Ranah, even unto Great " *Z*idon," and then the coast turneth to Ramah, " and to the strong city of Tyre."

Thus, we have three of the Hebrew tribes, *Z*ebulun, Dan and Asher, encompassing a small portion of territory, which they left to the Philistines, or Phœnicians, and which is undoubtedly referred to in Ezekiel xxv. 16, where it says, "I will stretch " out mine hand upon the Philistines, and I will " cut off the Cherethims, and destroy the *remnant*† " of the sea coast." Whether this remnant included the great city of Tyre at the time the tribes of Israel conquered, is a little uncertain, as it says, the boundary of the tribe of Asher, was *to the* strong city of Tyre,‡ but there is not the same doubt about *Z*idon. The tribes of *Z*ebulun and Asher, did not drive out the inhabitants of the conquered cities, which included *Z*idon, but allowed them to remain as *tributaries*. In Deborah's song, she asks, "Why " did Dan remain in ships? and Asher continue on " the sea-shore." Here, then, is a continuity of the most reliable evidence, showing that the inhabi-

* Josh. xix. 11, 41.

† Phœnicia, in her days of greatest prosperity, was of a length of 30 miles, and of an average breadth of a single mile.—"Carthage and the Carthaginians," by R. Bossworth Smith, M.A., p. 5.

‡ Judges i. 30, 31. § Judges v. 17.

tants of what is spoken of in Ezekiel (many centuries after the invasion of the tribes) as the "remnant" of the sea-coast, must have become almost amalgamated with the three conquering Hebrew tribes, and it is, therefore, natural and reasonable to conclude that they, (the Hebrews) must have participated in every way in the prosperity of Tyre and Zidon,* as they were the dominant power; so when Mr. Lindsay is speaking of the Jews he means the entire Hebrew nation, because the term Jew only took its rise after the return from the Babylonian captivity. From that time the Israelite race ceases to be spoken of as Hebrews, but Jews only; and as to this writer's saying the Hebrews' first knowledge of successful commerce was under David, the evidence as set forth shows, that they must have had that knowledge soon after their settlement in the Holy Land.

Dean Stanley, in his lectures "On the History of the Jewish Church," referring to the maritime power of the Jewish nation, speaks of Solomon's chief port Ezion-Geber, or the Giant's Backbone, situated on the Gulf of Akaba at the head of the Red Sea. It was from this port that Solomon

* Carthage proper, at the time of the Punic wars, consisted of the Byrsa (or citadel) quarter—a Greek word, corrupted from the *Canaanitish* Bozra or Bostra, that is, a fort—and of the Cothon, or harbour quarter, so important in the history of the final siege. To the north and west of these, and occupying all the vast space between them and the isthmus behind, were the Megara (Hebrew, Magriorim), that is, the suburbs and the gardens of Carthage, which, with the city proper, covered an area 23 miles in circumference.—"Carthage and the Carthaginians," pp. 10-19, R. Bossworth Smith.

prepared a fleet in 996 B.C. to go to Ophir. Lindsay says, "The fleets were manned by Tyrians "and Jewish supercargoes, and that the Tyrians "opened up the trade of Europe for the Jews." Here again, it is interesting to note, "manned by "Tyrians, but Jewish supercargoes." Of course the vessels, from the time of the occupation of the coast of Chittim, would be rowed or manned by the real Tyrians, for, as already noticed, the inhabitants of particular cities and villages were allowed to remain as tributaries, which would really mean *slaves*, the object of the tribes of Zebulun, Asher and Dan being, to allow them to remain (all the inhabitants of other parts having been expelled), as they themselves were totally unaccustomed to the sea, and, therefore, requiring the services of the Tyrians, or Phœnicians, the Hebrews remaining on board as supercargoes, which in those days would no doubt mean owner of vessel or cargo. In Ezekiel, chap. xxvii., it says, "The inhabitants of "Zidon and Arvad were the mariners, the wise "men of Tyre were pilots, the ancients of Gebal "and the wise men were the calkers." Lindsay finishes up the maritime career of the *Jewish people*, when Jehoshaphat lost his ships at Ezion-Geber, and that part fell into the hands of Tiglath-Pileser, the Assyrian King. Now this, again, may be perfectly correct as regards the Jewish *nation* or *people*, but it in no way diminishes the fact that the Phœnicians, who were for long after this occurrence the principal maritime people, were then, and for some time

before, a *nation* composed principally of the people of the Hebrew race. The reasoning set forth here, may be considered to receive a general confirmation, when Mr. Lindsay says,* "The Arabians, dis-"tinguished by the name of Saracens (that is "specifically the *Easterns*), who, from the earliest "period of history, were skilled as navigators, and "daring as seamen."

This particular point has been dwelt on at length, as it is especially interesting to many, and it is well to try and look at both sides of a question. It can be fairly and truthfully asserted that the Hebrews were just as much the mercantile and navigating people of the then-known world, as were the remains of the original Phœnician race. Ezekiel† speaks of the vessels of Tyre having the shipboards made of fir-trees or cypress of Senir, the masts of the cedars of Lebanon, the oars of the oaks of Bashan, the benches of ivory laid in larch from the isles of Chittim, fine linen from Egypt for sails; they also used palm ropes for their tackle.‡

Phœnicia had a large trade to the west, including Tarshish (Spain), Gades (now Cadiz) being the principal port and station. Tin was brought there overland from the Western Isles and Cornwall.§

* Lind., vol. i., p. 218.

† Ezekiel xxvii.—Isles (coasts). Ship-boards of fir (cypress). "Oars of oak of Bashan" (in larch or box). Benches of ivory (the decks or rudder literally "beam of ivory inlaid in larch"). Thy sail (serve thee for a flag). Traded *in thy fairs* (for thy wares).—"Holy Bible, with Various Readings and Renderings," Oxford, 1876.

‡ Herod. vii., 25.

§ Lind. vol. i, p. 10.

As regards the vexed and much-discussed question as to whether the *Jews* (or, we should say, the *Hebrews*) had any direct dealings with, or were established in these tin-producing places in early times, so much at least may be said, that all tin used in the manufacture of bronze (which late antiquarian discoveries have placed almost in a pre-historic time)* was brought from the west.

* Dr. Schliemann's "Discoveries in Greece."

CHAPTER II.

IN the lately-explored ruins of Nineveh, which in the last forty years have given such rich and priceless treasures to literature and art, and which speak of a high civilisation thousands of years ago, the excavation made in the mound of Balawat, by Mr. Hormuzd Rassam, in 1878, were consequent on the natives finding from time to time fine pieces of bronze work, which, on examination, proved to be a representation of the tribute paid by Tyre and Sidon to Shalmanesar III. (B.C. 859-825). This led to the discovery of the great bronze gates now in the British Museum. From the terra-cotta records, (which were the books of the period discovered on the same site,) it appears that these gates belonged to the sacred temple of the war-god Nergal, erected by the great king Assur-Nazir-pal (B.C. 885-859). The beautiful restoration of these splendid and richly-sculptured bronze works shows, that they were added to the temple by Shalmanesar III., the son of Assur. They form a pictorial record of the Assyrian king's victorious progresses. The parts that are most interesting,

and that bear upon our subject, are the following:— Shalmanesar enumerates the offering of the Hittite king Sangara, "300 talents of gold, 100 of silver, 300 of copper," and the same amount of iron, and "1,000 sheets of copper"; this occurs in 854 B.C. The mention of copper, and particularly of iron, at this early period, points to the countries from which the Phœnicians must have brought these metals. After conquering the Syrian allies, the victorious Assyrian pushes on to Phœnicia. One scene portrays the engineers of Shalmanesar constructing a pontoon bridge, the boats or pontoons composed of skins stretched on a twig frame-work, and covered with bitumen, exactly corresponding to the tub boat or keefa, now to be seen on the Tigris or Euphrates. Another bronze picture and its inscription speaks of the "tribute from the ships "of the Tyrians and Sidonians." It is an animated scene on the sea shore, with the city of Tyre on its rocky island. The tribute is being conveyed to the shore in boats; these have a high prow and stern, both decorated with rams' heads; they are propelled by broad curved oars; a man is rowing at either end of the vessel, and the cargo of goods being piled in the centre. The Tyrians here represented, have "a most Jewish cast of face," and wear on their heads the loose woven pointed caps worn to this day by the sailors of the Mediterranean. Tyre and Sidon poured into Assyria the wealth of distant lands visited by their hardy mariners.*

"Balawat," "The Times," May 29, 1879.

There are still other series on these bronze bas-reliefs, that go back to the fall of the early Assyrian Empire, after the reign of Tiglath-Pileser I. (B.C. 1120).

The late Mr. George Smith discovered a whole library of historic literature, giving us a most accurate and minute knowledge of the days of Sennacherib, who ascended the Assyrian throne, 12th day of Ab (July 16), 705 B.C. After laying waste Babylonia, Sennacherib marched to punish Egypt, Jerusalem, Samaria and maritime Tyre, for their intriguing—Egypt having drawn away the allegiance of Zidon, which at this time was the chief city of the "sea-going Phœnicians." The allied states were devastated, and the Jewish king Hezekiah had to pay as tribute all the spoil of the Holy City. Continual wars and rebellions at last determined the Assyrian king to make one grand effort, to end these continual troubles and intrigues. When Sennacherib swept down upon the Phœnician rulers who had long defied him, they took to their ships, with "their wives," "their wealth," and "royal treasure," and made for the Isle of Cyprus. In a like manner the rebels on the borders of the Persian Gulf took to their ships or light reed boats. The Assyrian monarch then availed himself of his Phœnician captives (B.C. 702) to build him a fleet, wherewith to hunt the rebellious Babylonians out of their watery hiding-places. The tablet reads, "Carpenters from "Syria, the spoil of my weapons in Nineveh I "caused to dwell, and great ships, the product of

" their land, skilfully they made, Tyrians, Zidonians " and Greeks (Yasnai), the conquests of my hand, I " placed in them." He made a royal dockyard at Nineveh, the ships, unladen, were floated down the Tigris, and from there through a canal to the more navigable Euphrates. This naval expedition was a great national undertaking, and shows clearly how novel maritime expeditions were to the Assyrians. The king propitiates his gods: " Sacrifices and " libations to Hea, the King of the Ocean, I caused " to be made a golden fish, and a golden ship I cast " into the sea."*

Mr. Layard's earlier discoveries in Nineveh (which have been for some time past in the British Museum) give some interesting illustrations in stone of the Assyrian and Babylonian vessels.

The Carthaginians carried on a flourishing trade through Cadiz; afterwards the Romans monopolised the maritime power, and, with it, the consequent prosperity of the world. The Romans distinguished their vessels according to the number of rows or banks of oars, such as " Biremes," " Triremes," &c.; " Olkas " were large tow barges; " Ponto," hence the word punt; " Gaulos," hence galleys and galleons. There were several other descriptive names. The manner of working the large number of rows of oars has always been a problem, neither thoroughly nor practically solved. The figureheads of the Greek and Roman vessels were grotesque, and

* " History of Sennacherib," edited by Rev. A. K. Sayce; from Translations of Cuneiform Inscriptions, by the late George Smith, 1878. —" The Times," December 23, 1878.

made in accordance with some superstition. Their vessels were painted in different colours. Names of Greek vessels were invariably feminine; those of the Romans occasionally masculine. Carving and painting eyes on the bows was a favourite device, and it is preserved to this day in some parts of the Mediterranean. About the middle period of the Roman supremacy, their vessels were steered by oars; they used a hawser with the capstan; one large squaresail and a small sail; sometimes one only of triangular form; anchors and rope cables. Rope cables for anchors were not replaced by chain cables till about the year 1824,* although it is on record that Louis IX. of France, in 1268, made a contract with the Genoese for building vessels, each one to be supplied "with three grapnels with chains." The Romans in navigating their vessels used the Gnomen, or sun-dial, in order to tell the hour by measuring the shadow of the sun at noon at different days and places; it was ascribed by Herodotus to the Babylonians; it was known to the Egyptians, Chaldeans, and Hebrews,† from whom the Greeks derived it, and was by them introduced into Rome during the first Punic war.‡ Hipparchus made the first map on the principle of "Mercator's projection," by transferring celestial latitudes and longitudes to the globe.

* By "Lloyd's Register," it appears that, in 1824, vessels had an iron cable, but did not receive the figures 1 and 2, denoting the equipment, without they had, as well, the hempen cables.

† Isaiah xxxvii. 8.

‡ "Popular Encyclopædia," p. 662; "Dial."

It is said that Ptolemy, in his map, erred in placing China 60° nearer Europe than it really was, which mistake led Columbus to believe America to be that distance less than that which he had to travel. Aristotle, in reasoning on the roundness of the globe, pointed out that the west coast of Spain was the fittest point of departure for India. Ancient navigators were guided by creeping along the coasts, and very little by astronomical observation. The mariner's compass was not known. Reliable evidence proves that this instrument originated in the west, probably Italy, and did not come from China and India, as once believed. About 200 B.C. Ptolemy Philopator built a great ship; her dimensions are said to have been in length 420 feet, breadth 57 feet, and depth 72 feet; she carried 4,000 rowers, had two beaks (used as our rams of the present day), and two sterns. The next great ship of ancient times was one built by Hiero of Syracuse.* The timber came from Mount Etna, the ropes from Spain, hemp and pitch from the banks of the Rhone. Archimedes invented a powerful screw for launching this vessel. The cabins were large and luxurious, the floors were of Mosaic work, representing the story of Iliad. There was also a temple to Venus, of Cypress wood inlaid with ivory. This ship had four wooden and eight iron anchors, and the mainmast was of a single tree. She was called the "Alexandrian," and is said to have carried "60,000 measures of corn, 10,000 "jars of Sicilian salt fish, 20,000 talents† weight of

* "Athenænus" (vols. 40-44); Lind., vol. i., pp. 66-67.

† 3,000 talents=80 tons.

"wool, and of other cargo 20,000 talents." She was sent to Alexandria* on account of a dearth of corn there, and bore this inscription, "Hiero, the son "of Hierocles the Dorian, who wields the sceptre of "Sicily, sends this ship bearing in her the fruits of "the earth, a rich gift to all Greece and her Islands. "Do thou, O Neptune! preserve in safety this ship "over the blue waves." It must here be borne in mind that immense fleets were the most prominent feature in the first destruction of Carthage by the Romans, and the retaliation of the Carthaginians by the invasion of Italy. The greatness of Constantinople, which dates from the sailing of Justinian thence, A.D. 533, for the conquest of Carthage, with a fleet of 500 transports and 20,000 mariners. The great invasions and changes to which nations were subject in early times, were consequent on the warlike races becoming maritime people, the outcome of which was, the rise of the most flourishing and civilised centres of the world.

The Rhodians, allies of the Romans, instituted such wise maritime laws, that they constituted the basis on which the Roman law was formed, and of which European and English maritime laws are the outcome. Gessoriacum (probably Boulogne) was the port whence Cæsar sailed at midnight, August 26th, B.C. 55, for Britain. At this same place Caligula built a lighthouse, or, as it was called, a pharos, the first lighthouse on record on any part of the seas adjacent to the British coast. Cæsar's

* Alexandria founded, B.C. 332.

fleet consisted of 80 vessels, containing a force of 8,000 men; there were also 18 transports conveying 800 horses. For his second invasion he had 600 boats, containing five legions, with 2,000 cavalry; there were also 28 war-galleys; the boats, it is considered, were flat-bottomed, so as to have little draught, and undecked, small boats being more suitable.* Agricola, the Roman general, about A.D. 80, was the first to sail round the whole of Britain. It was a Roman, named Carausius (who, tampering with the fleet he commanded, seized Britain, governing for seven years under the name of Augustus; he first created a British-manned navy in A.D. 287).

* Cæsar B. G., vol. i.; Lind., vol. i., p. 308.

CHAPTER III.

THE Saxons made their descent on Britain in boats covered with leather, which they called "ciol"; hence the English word "keels"—boats or barges now extensively used in the North of England, and carries 21 tons 4 cwt.—or a "keel of coals." The Vikings, or Norwegians, were the first to make a considerable advance in sailing their vessels,* and must have had a complete system of sails and rigging. They had a favourite vessel called the "Long Serpent,"† which is supposed to have been over 100 feet in length. A discovery of some of these vessels was made in Denmark, one of which was perfect; it measured 77 feet in length, and was an excellent model for speed. It was an open boat, and must have been entirely propelled by its 30 oars; the planks overlapped each other, or was what is technically termed "clinker-built." Altogether the boat was well constructed. The Danes chiefly called their vessels drakers and holkers; from the latter came the term hulk.

Alfred the Great was the first who met the invaders of his country on the seas, and built galleys

* Lind., vol. i., p. 334.

† Laing's Translation of the "Heimskingla," p. 135.

carrying 60 oars, being larger than those of his enemies;* he is termed the "Father of the British Navy."

There are no authentic accounts describing the fleet with which William the Conqueror invaded this country, but it is on record that he burnt and destroyed his vessels, so as to cut off retreat and save expense. In Mr. E. A. Freeman's "Norman Conquest" the number of the Conqueror's vessels range from 693 to 3,000, many of which were gifts from barons or prelates. William's own vessel was given him by his Duchess Matilda, and was called the "Mora."†

William the Second well maintained the English fleet, and Selden, who wrote on maritime laws, considers that England's supremacy by sea dates from this reign. During the Crusades, English vessels first took long voyages, and these wars gave an impetus to English shipping. It was during one of Richard Cœur de Lion's expeditions to the Holy Land that three of his vessels were lost in a gale, and the Vice-Chancellor of England was drowned.‡ His body was washed ashore on the Island of Cyprus, and tied round his neck was found the Great Seal of England. Richard I. increased the existing laws for shipping.§ In this very elaborate code are many curious laws. The sailors of Brittany had only one

* "Saxon Chronicle," A.D. 897; Florence of Worcester.

† "Norman Conquest," vol. iii., c. 15, pp. 376-1361.

‡ Sir H. Nicolas's "Hist. Roy. Nav.," book i., p. 77.

§ Mons. Pardessus' "Collection de lois Maritimes"; Sir H. Nicolas; Sir Travers Twiss' "The Black Book of the Admiralty"; Lind., vol. i., p. 379.

meal a day from the kitchen, while those of Normandy had two; and when the vessel was in a wine country the master had to provide them with wine. When in a foreign port only two sailors were allowed ashore at a time, and taking one meal with them, but no drink. The 23rd clause related to pilots. If they lost a vessel entering a port, and could not make good the damage, they had to lose their heads. As recently as the 22nd August, 1790, the French law condemned to the galleys for three years a pilot who lost his vessel accidentally, and, if wilfully, condemned him to death. To prevent wrecking, and pilots conniving in the same, the following clause was made, that—"If the lord of the place be so barbarous as not only to permit such inhuman people, "but also to maintain and assist them in such villainies, so that he may have such a share in such "wrecks, the said lord shall be apprehended, and all "his goods confiscated and sold, in order to make "restitution to the parties, and he himself be fastened "to a post or stake in the midst of his own mansion-"house, which being fired at the four corners, all "shall be burned together, the walls thereof shall be "demolished, the stones pulled down, and the place "converted into a market-place, for the sale of hogs "and swine only, to all posterity." The law for the wreckers—"Who, more barbarous, cruel, and in-"human than mad dogs, did sometimes, to gain "their apparel, moneys, or goods, murder and de-"stroy poor distressed seamen—in this case, the "lord of the country ought to execute justice on such

"wretches, to punish corporally as well as pecu-
"niarily, to plunge them in the sea till they are
"half dead, and then to have them drawn from the
"sea, and stoned to death." It is curious to note these severe laws, and to think that about this time the English Jews suffered their greatest persecutions from the King downwards, undergoing the most frightful tortures at the instigation of some lord, or at the hands of the populace, for which the perpetrators were seldom punished. The English Jews at this time, and for a long time previous, must have been very wealthy, as they lived in luxury compared with the ordinary trading and mercantile people. They must have principally gained their riches by legitimate trading with foreign parts, and therefore have been well acquainted with ships and their working.* The enormous sums of money exacted from them, could not have been produced unless they had been extensive merchants. Many interesting notes taken from records bear out this; for instance, several old English families with pure Hebrew names took their rise before, or immediately after, the expulsion of the Jews in 1290, these same families all originating in seaport places. Professor Max Müller, in a note to the writer, says, "There is a rough evi-
"dence to show that, during the Middle Ages, there
"were Jewish merchants in Cornwall trading in tin."

* Patents 9, Hen. 3.—

Jacobo de Antioch
Hereberto filio Jacobi
Giletto Crespion
} License to come into England with merchandise and do business.

"A Tour of London," &c., 1772, by M. Grossley, F.R.S., vol. i. p. 368.

This statement may be considered to refute to a great extent much he has written in his work, "Are there Jews in Cornwall," to prove that the Jews never had any considerable holding or trade in or about Cornwall.*

The 41st article of Magna Charta in 1215 says, "That all merchants shall have safe conduct to go "out of or come into England, and to stay there," &c. Lord Justice Coke, commenting on this, says that the merchants here mentioned were strangers, as few Englishmen at this time traded with foreign countries. About this period the Bishop and Commonalty of Marseilles stipulated that all Christians, *Jews*, and Saracens should have the right of frequenting the port with their merchandise, and of discharging *their ships*;† and, although religious differences were professedly not allowed to interfere with foreign commerce, the strangers were heavily taxed. Mr. Lindsay says:‡ "While the Christian "religious bodies received many privileges as ship-"pers, the Jews, throughout the whole of this period, "were ground down under excessive taxes. In the "same spirit the Venetians shut them out of and "from the Damascus trade, the Spaniards, as far as "they could, expelled them from Spain, and they

* For the name of "Jew's House," he requires "to make a jump or two." The history of this word cannot be traced with the same certainty as Marazion, but must be put down to the antics of language; and he concludes: "Thus vanish the Jews from Cornwall."—"Chips from a German Workshop," 4 vols. F. Max Müller. Vol. iii., "Are there Jews in Cornwall," p. 299.

† Lind., vol i., p. 468; De Ruffii, "Hist. de la Ville de Marseille," 2 vols.; Fabre, "Hist. de Marseille."

‡ Lind., vol. i., p. 469.

" were then universally persecuted, as much, it may " be said, from popular indignation against the social " evils they were supposed to promote, as from the " hatred engendered by religious prejudice. Yet, in " spite of the atrocious treatment which the Jews " received from the so-called Christians, they were " the means of greatly developing the commerce of " the Middle Ages, and have ever since rendered " important service in promoting friendly intercourse " between nations, and thereby extending civilisation. " To the Jews, as much as to the Lombard mer- " chants, we are indebted for the introduction of bills " of exchange, by which great facilities have been " afforded for the development of trade, and as a " system of the most perfect security established for " remittances to the most distant parts of the globe." Quoting this at length shows the great liberality of Mr. Lindsay in speaking of the Jews, and also proves with what has been already stated, that the very early English Jews must have been intimately connected with shipping and commerce, and not deriving their wealth entirely from usury and other ignoble sources.

Under Henry III., 1216, the first memorable sea-fight against the French took place, when the English vessels were victorious over double their number. The English vessels from the Cinque Ports particularly distinguished themselves, for which these ports were granted further special privileges, such as " to annoy the subjects of France,"* viz., to plunder

* Charter of Edward I. (1272—1307) to the Cinque Ports.

as they liked. From this arose an universal system of piracy, against which the Hanseatic League or Corporation was founded, being a commercial combination of several towns in the Netherlands. The ships of this period carried sails and long boats on deck; the ends of the vessels were so raised as to resemble castles, from which the word forecastle comes. During this reign, Liverpool is first mentioned as having any maritime trade; but it was very insignificant for long after, and this great town ranked as a village till 1699.* The Mersey contributed only one vessel with six men for Edward III.'s Calais fleet.†

In Edward III.'s reign coal, then called "sea coal," was first brought from the great field of the North, the trade being carried on by foreign vessels. The prohibition against the use of coal in England gave no encouragement to the trade. One royal edict prevented its use in the city of London, as it might prove pernicious to the Queen's health when she resided there.‡ The first complete roll of an English navy was made in 1347, when Edward began the siege of Calais. This fleet consisted principally of merchant vessels contributed by the different ports, Yarmouth sending the greatest number of men,

* Patent, 25th March, 1229, "Henry III. to the Sheriff and his Bailiffs of Lancaster: That the honest men of 'Leverepul' should hold and pay farm rent from the Feast of St. Michael for 4 years at the yearly rent of £10 (now equal to £150) for all the royal rights in the Borough of Liverpool. Given by the King at Marlborough."—Sir Henry Spelman's "Villare Anglicum," "Lerpoole Haven, Lanc., West Darby Hundred."

† Atkin's "Manchester," p. 332.

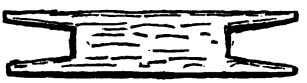
‡ Stowe's "Survey of Lond.," p. 925.

while Fowey, in Cornwall, now a very small port, sent the largest number of ships, this port and Dartmouth each sending more ships and seamen than London.* Fowey was one of the principal places for the shipment of tin.† During Edward's war with France his fleet consisted of 1,100 vessels and 100,000 men; Paris was taken; but at La Rochelle his fleet, under the Earl of Pembroke, was entirely destroyed by the combined squadrons of France and Castile.

Henry V.'s fleet for the invasion of France consisted of 1,500 vessels. He had several large ships built at Southampton, respectively called the "Trinity," "Holy Ghost," and the "Grâce-de-Dieu." His two flag ships, called the "King's Chamber" and his "Hall," were magnificently furnished, and had purple sails, on which were embroidered the arms of England and France. There was written in black letter, about the year 1418, a curious rhyming document, called "The Dominion of the Sea." It was an exhortation for England to keep the seas, describing her commerce and that of other countries. It is in this writing that the first distinct mention on record

* London, 25 ships, mariners 662; Fowey, 47 ships, mariners 770; Dartmouth, 31 ships, mariners 757.—MSS. Harl., 246 f., 12 b., and 3968, f. 130.

† Royal Institution Museum, Truro. Slab of tin found on the Barton of Carnanton, par. of Mawgan Pyder, two and a half feet below swampy ground, contiguous to what is usually called a "Jew's House," weight 39½ lbs.



is made of the mariner's compass being in general use; it was termed the "Shipman's Card."* In 1416, England for the first time asserted her right to the dominion of the sea. But, although her sea fights had given an impetus to shipbuilding, and brought out the seafaring qualities of the English people, owing to these wars being carried on principally to gratify ambition, they impoverished instead of adding to the wealth and commerce of the kingdom. By an Act 9, Hen. V., all ships had to be properly measured for their capacity or tonnage. For long after this reign the commerce and trade of the country remained in a very low condition; but for all that there were several shipowners who became distinguished and wealthy. John Tavener, of Kingston-upon-Hull, and William Canynge, Mayor of Bristol† (an ancestor of George Canning), had special privileges granted them; they owned some of the largest vessels, ranging from 400 to 900 tons burden.

Edward IV. gave encouragement to shipping by the foreign treaties he made. The consequence was in Richard III.'s reign English commerce had so extended itself abroad that it gave rise to the first English Consul being appointed in the Mediterranean at Florence in 1490.‡

* "Hakluyt," vol. i., "Dominion of the Sea"; Nich., "Hist. of Roy. Navy"; Lind., vol. i., p. 442.

† Illustrations of the History of Bristol, by S. Lucas, M.A.; Lind., vol. i., p. 456.

‡ Fœdera, xii., p. 270; Lind., vol. i., p. 468.

CHAPTER IV.

TURNING aside for a while from England, attention is called to some of her chief maritime contemporaries, bringing their histories up to the close of the 15th century. The Venetians rose to great importance about the end of the 10th century; they were exceedingly industrious, frugal and daring, and it is said that in the year 827 they carried off the body of St. Mark from Alexandria. This robbery was accomplished by the crews of 10 galleys. At the time of the Crusaders, they were the first maritime people in the world, and in 1159 they claimed the dominion of the seas, taking advantage of the Pope's exclamation to the Doge, "That the "sea be subject to you as the spouse to her husband, "since you acquired it by victory."* Hence arose the annual custom of the Doge marrying the Adriatic by dropping a ring into that sea, amidst the most splendid formalities. The Doge's barge was called the "Bucentaur"; it was 110 feet long, and 21 feet wide, and gorgeously furnished. The ceremony was kept up to the year 1793, when the "Bucentaur" was deprived of its magnificence by Napoleon, and

* "History of Venice"; "Universal History," xxiii., p. 414.; E. Smedley's "Sketches of Venetian History," i., p. 72.

it was finally destroyed in 1824.* The Venetians in the zenith of their power were very prohibitive in their commercial dealings. Foreigners were allowed to remain and trade in certain cities, the Jews being from first to last the leading bankers. The arsenal and dockyards of Venice were the finest in the world; her galleys had masts of extraordinary height, with one sail on each. In 1268 they contracted to furnish the King of France with 15 ships. The largest was 110 feet long, 40 feet wide, and 39½ feet deep; this depth must have been taken at the raised ends. The cost was £933. 6s. 8d. present value; she carried 110 men.

The vessels belonging to the Italian Republics were of great variety; among them were galleons and busses. The gondola of the present day is a boat of great antiquity, and has not altered in form. At the end of the 15th century, the Venetians, Florentines, and Genoese ships do not seem to have exceeded or even attained the size of the English vessels, although their commerce was far more extensive.

In the middle ages swearing had become so general amongst sailors that the Church and State made special laws against it, and in 1543 a decree was

* On a lake called the "Mar," in the grounds of the King of Spain's mountain palace at La Granja, there is an ancient gondola, or canopied bucentaur, which is finely carved and gilt, and has laid neglected for centuries. It is supposed to have been given by the Venetian Republic to the Emperor Charles V. There is so little known about this beautiful specimen of mediæval boat-building that the monkish antiquarians of the collegiate church have only a "belief" as to its origin.—"A Royal Castle in the Air," "The Times," 3rd Sept., 1879.

issued (to use the words of the clause) against "this most damnable custom."*

It is necessary now to mention the most eventful occurrences in the history of navigation in connection with Spain and Portugal. Spanish shipping and commerce rose to its greatest prosperity during the reign of Ferdinand and Isabella. They possessed many large vessels and ports, of which Barcelona seems to have been the most important. Columbus' repeated failures at the Court of Portugal caused him to return to his native city Genoa. He then went to Spain, and, after many trials and privations, ultimately succeeded in gaining the favour of Ferdinand and Isabella. Before this was accomplished, Columbus had sent his brother Bartholomew to London to intercede for him with Henry VII. On his way he was captured by pirates, and reached London in a great state of destitution. He had to gain a subsistence by making charts; one for Henry VII. was a map of the world, dated 13th February, 1488. But this mission had no success. At last, on the 17th April, 1492, Columbus got the grant for his expedition from the King and Queen of Spain. He asked for only three vessels; two small ones, called caravels (with forecastle and cabins at the ends, but open in the centre); the third was decked throughout, and is supposed not to have been more than of 200 tons burden. The vessels were named, the "Santa Maria," "Pinta," and "Nina." They sailed with a crew of 120 on Friday, 3rd August,

* Arch. Nav., ii., p. 109.

1492 (which seems a curious day, as, according to the strong Catholic superstition then prevailing, it was unlucky). The first land discovered was one of the Bahama Islands, on the 12th October, 1492. The natives had canoes hollowed out of single trees, and Columbus says in his journal, he saw one that held 150 persons. The beds of these aborigines were made of a cotton net, called by them "hamacs," hence the word hammock. Columbus set sail for home with two vessels (the third having been wrecked), 4th January, 1493, arriving at St. Mary's 18th February. He sailed on his second voyage 25th September, 1493, with three large vessels and 14 caravels, containing 1,500 persons, horses, and all sorts of stores for colonising. He arrived at an uninhabited island, afterwards called Dominica, 2nd November, 1493. Towards the end of the year 1500, Columbus returned home from his third voyage. By the jealousies and intrigues at the Court of Spain, he landed as a prisoner in the country for which he had gained such glory. Columbus was reinstated in favour, and sailed on his fourth and last voyage 9th May, 1502. This great man died 20th May, 1506, aged about 70. Ill requited during his life, nearly four centuries after his death the Vatican was debating about making him a saint.*

* The burial place of Columbus is somewhat involved in mystery; his body was taken by his grandson to the cathedral church of San Domingo, according to the wish contained in Columbus' will. This church became the mausoleum of the family. In 1795, when the island was given up to the French, the remains were sent with great pomp to Havanna, but a late discovery in the San Domingo church renews the doubt whether the guardians of the church permitted the

It was before the voyages of Columbus that the Cape of Good Hope was discovered by the Portuguese, under Bartholomew Diaz, and their famous navigator, Vasco de Gama, sailed round it, and first sighted India 26th August, 1498, landing at Lisbon, 18th September, 1499, after an absence of two years and eight months. The Western European trade to India dates from this time. Fernando de Magalhaens, a Portuguese, in the service of the King of Spain, discovered the Straits of Magellan. He set out with five small vessels, the largest being 130 tons, and crews numbering 230. He discovered the Pacific Ocean. He lost his life during an engagement with the natives of the Philippine Islands, but his vessels proceeded; they rounded the Cape of Good Hope, and thus accomplished the first voyage round the world.

To return to the history of English shipping, from which there will now be little cause for digression. Henry VII. gave great encouragement to the maritime pursuits and inclinations of his people, being himself a shipowner and merchant, owing to which he left large sums of money at his death. Strict prohibitive laws, forbidding certain merchandise to be carried except in English vessels, gave England a great monopoly; and large ships traded annually with the Levant. A type of the smaller class of vessel was the "Holy Cross," of 160 tons; she is described as a short ship, and traded with Crete and

true remains to be sent or not."—Sir Travers Twiss, Q.C., on the "Alleged Discovery of the Remains of Columbus," "Nautical Magazine," June 1879.

Chios. It appears from different records that the English vessels were indifferent sailers, and to prove this the "Holy Cross" took 12 months to make her last voyage. Another vessel, the "Matthew Gonson," of 300 tons, crew 100 men, carrying three boats, took 11 months for a Levant voyage. Henry VII. gave a patent, 5 March, 1496, to John Cabot, a Venetian, and his three sons, Lewis, Sebastian and Sanctus, to discover and conquer all the lands he could. On 21st June, 1497, Sebastian Cabot (who was born in Bristol) sailed in his ship "Matthew," of 200 tons, and discovered Newfoundland, which at first was called the New Isle. Sebastian Cabot made many voyages, changing continually his service between Henry VIII. of England and Charles V. of Spain; to the latter he bore the title of pilot-major. He returned to his native city, Bristol, in 1549.

Henry VIII. made the first standing Royal navy, and established an admiralty. He showed considerable skill in designing many things himself in the construction of his ships.* When France prepared to invade England, Henry and his people made great exertions; but, although he collected an army of 140,000 English soldiers, he had only 60 ships. (Our ships at the present time are more than enough for the number of soldiers—a great contrast!) Vessels were soon provided, and at great sacrifice by the people, in the same spirit they have always shown

* In 1546, when his vessels were first classed, a ship was defined as "a hollow building made to pass over the sea with sail."—James' "Nav. Hist.," p. 4. (Charnock, vol. ii., p. 247.)

whenever Britain's shores are menaced. The largest vessel was the king's, the "Harry Grace à Dieu," of 1,000 tons, built at Erith in 1515, having a very high forecastle and poop, and a peculiar rig. She was the first three-decked ship built in England, and carried 80 cannon. In 1552 she appears as the "Edward." It is in a picture of this ship that port-holes first appear; they were invented, with other improvements, by Descharges, a French builder, at Brest.* Henry had previously built the "Regent." † At the king's death the royal navy consisted of the "Harry Grace à Dieu," and 12 others, 14 galleys, 5 pynasses, and 11 row-barges; all these vessels were at Portsmouth; at Deptford, 6 vessels; in Scotland, 4 vessels. The manning of this fleet required 1,885 soldiers, 757 gunners, and 5,136 seamen. James IV. of Scotland built a ship called the "Great Michael" in 1512; she was 240 feet long, and 38 feet wide; she took a year and a day to complete, and cost £50,000 present value; she had a crew of 300, 80 gunners, and 1,000 soldiers. The town of Bridport, during Henry's reign, had a monopoly of the manufacture of hempen cables for the royal and merchant vessels.

Edward VI., as a child, knew all the particulars

* James' "Naval History," (introduction).

† The "Great Harry," which was built in 1488, and was the only ship in the British fleet with three masts till 1545. She was burnt at Woolwich in 1553.—James' "Naval History," (introduction). There was also the "Mary Rose," which sank at Spithead in 1545. Venetians were engaged to raise her. Peeter de Andreas was employed, assisted by his ship carpenter and three of his sailors, attended by 60 English mariners.—Preface to "Smiles' Engineers."

of the harbours of England, France, and Scotland, and also took an intense interest in everything relating to navigation. He eagerly sought the advice and counsel of Sebastian Cabot, the outcome of which was the formation of the company of the Merchant Adventurers. Cabot recommended an expedition of three ships to discover the northern part of the world. These ships were to have strong and well-seasoned planks, "to guard against "the worms which many times pearceth and eateth "through the strongest oak." This passage refers to the "Terredos navalis," or ship-worm; and, from its way of working, Sir Isambert Brunel took his first lessons in forming the Thames Tunnel.* Sheathing was, for the first time, to be used in England, and the keels of the vessels were to be covered with thin sheets of lead. Edward gave letters of safe conduct, addressed to all potentates, for this expedition, under Sir Hugh Willoughby, written in Latin, Hebrew and Chaldee. (The coronation medals of Edward VI. give his titles in Greek, Latin and Hebrew.) The most elaborate instructions were drawn up for the expedition, containing laws against committing vices and sins, that morning and evening prayers, and other services, should be performed. Sir Hugh Willoughby sailed 20th May, 1553, passing the palace of Greenwich with great pomp; but, unfortunately, the young king lay sick, and did not see that which he had so earnestly interested himself in organising. Sir

* Smiles' "Self Help," p. 121.

Hugh Willoughby and the crews of two ships perished in the Arctic regions. The pilot-major, Chancellor, reached the rendezvous in Norway, and ultimately was the means of opening commercial relations between Russia and England. The first Russian ambassador arrived in London 27th February, 1557. He was lodged in great state in "Fantchurch Streete," and returned in the "noble shippe the Primrose." Sebastian Cabot, when an extremely old man, was deprived of his pension by Philip, the husband of Mary, Queen of England. He died in neglect, and no record has yet been discovered to show where he was buried.

CHAPTER V.

A MOST eventful period of English history is the reign of Elizabeth. She commenced her reign embarrassed by the enmity of France and Spain, the latter showing feelings of hatred and revenge, arising from several causes, amongst which were the depredations committed by English vessels. When the war commenced, 1559, the royal fleet in commission consisted of seven coastguard vessels, the largest 130 tons, and eight brigs and schooners. In harbour were only 23 war vessels, a new one of 800 tons, one of 700 tons, and others from 600 tons down to 200, also a few small craft. These were all that remained of Henry VIII.'s royal fleet. English privateers were licensed to a great extent, and they committed untold destruction on the vessels of France and Spain. Very many men of good English families took the law into their own hands, and did pretty much as they liked, their excuse being, that they were taking revenge for the fearful persecutions of the Inquisition. At last, in January, 1564, Philip of Spain, in retaliation, seized 30 English vessels then in port, as security, he said, for a loss of 1,500,000 ducats inflicted on Spanish

vessels. Elizabeth had to endure this insult, for she was at war with France; but she made a strong remonstrance, and forbade all Spanish and Flemish vessels to enter English ports. Philip gave in, and soon after, the French war ceasing, Elizabeth, for the first time, really tried to put down these privateers; but they had become so powerful that she was unable to cope with them, they defiantly capturing one of Philip's own ships, which act caused great uneasiness at the English court.

Eventually, these privateers and pirates, finding matters getting too warm for them, turned their attention to carrying the natives of Africa to America; and thus commenced the slave trade. This infamous traffic may be said to have been the only slur on shipping, so rarely turned to ignoble use; for, lawless and bad as privateering and piracy were, and much as this system of sea robbery is to be deprecated, in a moral point of view; there is no denying the fact that these free-booters originated the grandeur and supremacy of the British navy. If Englishmen were the first to start this slave traffic, they were also the first to abandon it, and by heavy payments. It shows how the minds of people were constituted at this time, when even the queen and her counsellors shared in the profits out of slave expeditions. This state of mind, influenced entirely by greed, continued down to very recent times, many of the most influential families in our large seaports taking their rise and wealth from this lucrative but wicked

trade. It were an injustice not to mention here the names of Clarkson and Wilberforce, through whose benevolent exertions England owes the discontinuance of a traffic, which for a long time tarnished the glory of the British flag. If the country could afford to forego much material advantage from the slave trade, there is no reason to doubt that it can make greater advances still in the cause of humanity, at the sacrifice of pecuniary gain. This trade and buccaneering so displaced legitimate commerce, that in the 14th of Elizabeth's reign there were only 50,000 tons of shipping engaged in honest pursuits. At last the result of all these depredations on Spain and her shipping, was, the fitting out of the famous Spanish Armada, which consisted of 132 ships and 20 caravels, altogether of 59,120 tons; also 4 galliasses and 4 galleys; the whole fleet manned by 32,709 men. The collective English fleet consisted of 197 ships, of 29,744 tons, and 15,785 mariners. The Armada was destroyed 19th July, 1588, and only 53 ships eventually returned to Spain. It is said that the tables in the college hall of Westminster school are made of chestnut taken from the Spanish ships.

In 1576 the celebrated Martin Frobisher fitted out an expedition to China by a north-west passage. He had two vessels, the "Gabriel" and the "Michael," each of 25 tons, and a pinnace of 10 tons. The result was the discovery of Greenland. In 1577 Francis Drake made the second voyage

round the world, being the first accomplished by an Englishman. His vessels were the "Pelican," 100 tons; the "Elizabeth," 80 tons; "Swan," 50 tons; "Marigold," of 30, and the "Cristopher," a pinnace of 15 tons; crews numbering 164 men. Sir Walter Raleigh was the means of founding the first English colonies in America. Having arranged several expeditions, he at last sailed himself, in 1595. Of all the great navigators and admirals of this period, Sir Walter Raleigh was the foremost. It is not shown that he was simply a pirate or buccaneer, as so many of the other well-known men were; but he was a learned and accomplished man, one of the most interesting characters in English history.

A voyage to the East Indies, by Thomas Cavendish, in 1591, gave rise to the East India Company, in 1600. Their capital was £172,000. They sent out five vessels: the "Dragon," 600 tons; "Hector," 300 tons; "Guest," 130 tons, and two vessels of 200 tons each; the number of men, 480; cost of vessels £45,000, and their cargoes £27,000. About this time the trade between the English and the Dutch was considerable, and they mutually insured their cargoes against losses, this being the first record of insurance in England.

The question has rarely been asked whether the Jews had, from the time of their expulsion in 1290, any communication or dealing with England. It is proposed here to bring forward data, from which it may be reasonable to surmise that such was the case.

As to Jews being in England, several records of the Keeper of the House for Converted Jews, in Chancery Lane, dating from 1331 to the 6th James I., in 1608, show that during this period there were several conversions, the men receiving a daily allowance of 1½d., and the women of 1d. As regards Jews trading with England, in several old wills of persons with pure Hebrew names we find that the testators were mariners (this word mariner may have meant, in those days, one who travelled the sea, not necessarily a sailor), that each member of their families bore a Hebrew name, that they lived at Wapping, or near the river.* Even in such an important document as a will, it is often found, up to the end of the last century, that the testator's name varied in spelling, and his calling would often bear two or more designations. Holland being an adjacent country, "whose naval greatness and "prosperity were owing to her own people, and to "every foreigner who sought an asylum in her terri-"tories, she granted the fullest religious and political "freedom.' † To that country flocked many of the learned and wealthy Jews from Spain, through fear of the Inquisition. This Inquisition, be it remembered, gave Queen Elizabeth's Protestant subjects a pretext for their depredations on Spanish

* "In the year 1740 the Parliament passed an Act, by which all Jews "who had resided seven years in any of our American colonies, or had "served two years on board any of his Majesty's ships of war, were "declared natural-born subjects of Great Britain, without taking the "Sacrament; of which several hundreds of them enjoyed the benefit." —"An Apology for the Naturalisation of the Jews," p. 25.

† Lind., vol. ii.

vessels. This was a reason for anyone trading from the Netherlands to expect to receive some countenance in England.* This inference may be strengthened by the fact of Edward VI. giving Sir Hugh Willoughby his safe conduct passes written in Hebrew,† as well as in other languages. In 1649 one Michael Ben‡ Alexander (who, from his name, may have been a Jew), an Arabian merchant, petitioned Parliament for losses he had sustained on the English coast.§ It was the year after this that Manasseh Ben Israel's work, entitled "Hope of Israel," appeared,|| the translation being sold at the "Crown," in Pope's Head Alley, Cornhill. The anxiety of the Dutch Jews to take full advantage of all avenues of commerce was proved by Manasseh Ben Israel's mission.¶ Authentic documents prove that the fear of persecution did not

* The exclusive privileges of the Steelyard Company of Foreign Merchants were formerly withdrawn in 1552; but, for the want of an English mercantile navy, the greater part of the foreign carrying trade of the country was for long after conducted by foreign ships. The withdrawal of the privileges, however, stimulated the home trade, and the English merchant adventurers in the following year shipped no less than 40,000 pieces of cloth. Clothmaking became now one of the staple manufactures of England, and the English artisans were largely assisted by the Protestant refugees from French Flanders and the low countries.—Smiles' "Lives of the Engineers," vol. i., p. 102.

† See p. 33.

‡ Ben is the Hebrew, Ibn the Arabic, both meaning "the son of."

§ "Printed Journal of Occurrences in Parliament"—Wednesday, 20th June, 1649. Printed by Robert Ibbitson, London. (Part torn out, Guildhall Library; not in British Museum.)

|| Wednesday, 10th July, 1650.

¶ "A Tour of London, or New Observations on England," M. Grossley, F.R.S., &c. Translated from the French by Thomas Nugent, 1772, p. 363, vol. i., "Jews." Vol. i., p. 368: "In the

entirely deter Jews from living in prohibited countries. A letter, dated Genoa, 14th July, 1654, tells us* that "advices from Madrid say that 600 men "who professed the Jewish religion have been appre-"hended there, and although, by the laws of Spain, "they were to be put to death, they have been con-"demned to serve in the gallies." Throughout the early and middle periods of English commerce, the cloth and wool trades have held perhaps the leading places, the cloths of Suffolk, Gloucestershire, Worcestershire, and Coventry being specially noted.† One of the arguments for the naturalisation of the Jews, published in 1753, was that they had held the woollen trade of England in their hands for a long period;‡ and, as if to give some foundation for this, there also appears, in wills of the 16th, 17th, and 18th centuries, men with Hebrew names who were clothiers, (not meaning, as it does now, a manufacturer of clothes, but a weaver of woollen cloths). In Suffolk, Essex, &c., these clothiers were landowners, and had considerable property; therefore, supposing they were Jews, they must

following centuries the incapacity of the English for commerce had caused the Jews to be recalled to England, from whence they were banished in the fourteenth century."

* "Printed Journal of Occurrences in Parliament"—1654, Aug. 3. Printed by Robert Ibbitson, London.

† Smiles' "Lives of the Engineers," vol. i., p. 102. See foot note, p. 40.

‡ "An Apology for the Naturalisation of the Jews," p. 27. The following were some of the reasons in recommending the Bill: "In-"creasing the shipping, and encouraging the exportation of the woollen "and other manufactures of this kingdom, of which the Jews have for "many years exported great quantities."

have either changed their religion or practised it secretly. That Jews did the latter in all countries, there is full evidence to show, as already mentioned.*

The East India Company in 1609 commenced the largest merchant vessel hitherto built, called the "Trades Increase," of 1,200 tons. In 1615 England's merchant shipping had sunk to a very low ebb; it is recorded that there were only 10 ships belonging to London over 200 tons.

In 1612 the Shipwright's Guild was incorporated, and Mr. Phineas Pett became the first master.

It was the unfortunate demand for "ship money" (raised to fit out vessels without the sanction of Parliament) that caused the rebellion which eventually cost Charles I. his life. At this period the Dutch became, for the time, the ruling maritime power, and really monopolised the trade of the world; it shows their immense energy and resource to accomplish so much, for, as Sir Walter Raleigh said of them, "Although they built more vessels "than any other country, they had not a tree in their "country."

* "The Booke made by the Right Worshipful Mr. Robert Thorne, "in 1527, in Sivil, to Dr. Ley, Lord Ambassadour for King Henry VIII., "to Charles the Emperour, being information of parts of the World "about the Jews expelled from Castill in Spain to Portingall, for they "would not turn Christians, and carried with them infinite number of "gold and silver. The King of Spain, under some sort of extradition "treaty, said that if the King of Portingall would give him a million of "golde or more, which the Jews had carried away, he would give the "West India Islands they (the Spaniards) had discovered, and they "would desist from discovering more; A.D. 1492." Appendix i., Lindsay, vol. ii.

At last England, waking up to the neglect of her shipping, entered into hot rivalry with the Dutch, making certain restrictive laws, which gradually led to war between the two countries. Many memorable sea-fights took place, the British and the Dutch alternately beating one another.

A peaceful and memorable incident ought to be noted, which took place before the aforementioned troubles began, December 22nd, 1620, viz., the arrival at what is now Plymouth, Massachusetts, of 101 Pilgrim Fathers, in the ship "Mayflower"; the ancestors of the best and truest Americans. There is a saying that in many of the oldest families of America a chair is preserved that came over in the "Mayflower"; the number thus accredited is so great that they would, however, give several "Mayflowers" full cargoes.

The most notable war vessel of this period was the "Sovereign of the Seas," built at Woolwich, 1637, by Mr. Phineas Pett. The tonnage is uncertain, but said at various times to have been from 1,141 to 1,683 tons. She carried 126 guns.*

* James' "Naval History."

CHAPTER VI.

THE first wet dock made was the Commercial Dock, London, in 1660; a harbour and graving, or dry dock, at Port Glasgow, in 1662. By an act 8. Anne, c. xii., a wet dock was made at Liverpool, in 1709. The Liverpool and Birkenhead Docks are now the largest and most extensive in the world, being, in 1871, over six miles long—260 acres, 18 lineal miles of quays, for Liverpool side; 116 acres, and 9 lineal miles of quays at Birkenhead; both sides including upwards of 100 docks of all sorts. The capital is now over £15,000,000.*

Although peace was concluded between the Dutch and English, war soon again broke out in Charles II.'s time, and the English received some of the greatest defeats they ever sustained on the seas; the Dutch admiral, De Ruyter, sailing up the Thames, burning many ships, besides doing other damage.†

In 1666 English ships cost somewhat under £8 per ton, while in Sweden and Denmark they were

* Lind., vol ii., p. 409.

† Curious MSS. lists, drawn up in 1677 for Charles II.'s private use, belonging now to the Surveyor of the Navy's office, which give an account of the state of the navy in the 17th century, giving a total of 129 ships, divided into 31 classes. In August, 1714 a list gives a total of 198 ships divided into 10 classes.

built for nearly half that price. The New Forest was kept up with the idea of providing oak for the royal ships. It was not long after peace being again concluded with the Dutch, that England's old troubles with France recommenced. Immense damage was done to English shipping, till France sustained the great defeat of La Hogue, May 12, 1692.

An interesting incident in connection with shipbuilding is, that about the year 1699, Peter the Great left his kingdom for a time, to work as a carpenter in the shipbuilding yards of Holland. He afterwards came to Deptford Dockyard, where he worked and lived as an ordinary carpenter or shipwright. He returned to Russia with considerable practical knowledge and skill, by which he formed the first Russian navy.

At the commencement of the 18th century several British navigators became prominent. First came Dampier, then Commodore Anson, who made a disastrous voyage round the world, lasting three years and nine months. Out of six ships, Anson's vessel, the "Centurion," was the only one to return; her figurehead was, until lately, in the grounds of the Royal Naval School at Greenwich. Captain James Cook entered the royal service in 1775, after having been in the east coast coal trade—colliers of this date existed to within the last few years.

In 1768 Captain Cook, in the "Endeavour," a Whitby vessel, sailed for Otaheite, in order to observe the transit of Venus over the sun. He discovered New Zealand and New South Wales, and

returned home by the way of the Cape of Good Hope, after an absence of two years and eleven months. His second voyage was with the "Resolution," of 462 tons, and the "Adventure," of 336 tons. He was away three years and eighteen days. The 12th July, 1776, Captain Cook went his third, and last, voyage with the ship "Resolution," and another, the "Discovery." He was killed at Owhyhee, December 26th, 1779.

In 1779 Great Britain was at war with France, Spain, and the lately revolted American colonies, and in 1781 the Dutch were added to her antagonists; the consequence was her shipping dropped, in 1782, to 615,150 tons of outward and inward clearances, of which there were 225,456 tons foreign clearances. In 1785 the entries outwards and inwards reached 1,182,346 tons, of which only 107,484 tons were foreign vessels; this proving, that even against such odds, great Britain held her naval supremacy. August 1st, 1786, the new Registry Act* for the measurement of all decked vessels came into operation.

Before 1780 the slave trade was flourishing; on an average, 22,500 slaves were carried annually by British vessels. The size of a slaver† was as follows: length of lower deck, 100 feet; breadth inside, 25 feet 4 inches; depth of hold from ceiling to lower deck, 10 feet; height between deck, 5 feet 8 inches; number of ports, 14. Such a vessel, when leaving Africa, besides her crew, had on board 351 men, 121 women, 90

* 26, Geo. III., cap. 60.

† The ship "Brooks," Lind., ii.

boys, and 41 girls—a total of 609; she lost by death on the passage of 49 days, 10 men, 5 women, 3 boys, and 1 girl. Imagine over 600 souls on board a vessel no larger than a good-sized coasting brig of the present time, with no standing room between decks.

At the commencement of the great French war, 1st February, 1793, Great Britain had 16,079 merchant vessels, of 1,540,145 tons, manned by 118,286 seamen; and, strange to say, her shipping did not suffer, which was owing to the courage and loyalty of all her seamen. England triumphed on the sea, which somewhat embarrassed Napoleon in his victorious career on land. In good British strength and loyalty did Mr. Pitt speak out against the combined efforts of France, Prussia, Denmark, Sweden, Russia and the United States of America, to break the maritime neutrality laws, viz., that a neutral flag should cover enemies' goods, with the exception of a few warlike articles. He declared, "Rather than sacrifice our "naval greatness at the shrine of Russia, it were "better to envelop ourselves in our own flag, and "proudly find our grave in the deep, than admit "such principles in the maritime code of civilised "nations." We all know how Nelson, and others of Britain's naval commanders, fought for this independent and noble sentiment.*

* Touching this is an amusing anecdote. In 1862 Dickens was travelling with an old French priest, who was very cross with the toothache, and who said that we had no antiquities in heretical England. "None at all!" replied Dickens "You have some ships, 'however." "Yes, a few." "Are they strong?" "Well," said Dickens, "your trade is spiritual, my father; ask the ghost of

On 18th May, 1803, the short peace of one and a half years was again broken, and Napoleon made great preparation for his invasion of England. He collected a considerable number of all sorts of craft suitable for a descent on the British coast. The effect of this declaration of war, and the immediate consequences, was to reduce English exports from £41,411,966, in 1802, to £31,438,985 in 1803; it also caused the introduction of foreign shipping (neutral) to the extent of 112,819 tons, whilst British shipping was reduced by 173,900 tons.

In 1805, the year of England's greatest naval victory, 87 British ships were launched, the largest number ever added in one year to the navy. Of these, 80 were built in private yards; 48 were gun brigs of a light draught, and only armed with 18-pounder carronades.* The battle of Trafalgar was fought on the 21st October; the number of vessels in the British fleet actually engaged was 28, against 33 vessels of the combined fleets of France and Spain. There fell in this action, on the English side, 2 admirals, 26 captains, 152 officers, 4,894 seamen; 2,064 seamen were drowned, and 109 officers and 3,294 seamen wounded; total 10,471.† It is difficult

"Nelson." A French captain who was in the carriage was immensely delighted with this small joke.—Forster's "Life of Dickens," vol. ii., p. 285. There is also, in the same work, an amusing sketch of life on a Mediterranean mail steamer (vol. ii., pp. 96, 97), and a comic allusion to their "Towing the whole of the Greek navy, namely, a "brig, which had just burnt out the bottom of her new boilers."

* James' "Naval History," vol. iii., p. 296.

† "The Despatches and Letters of Lord Viscount Nelson," by Sir Nicholas H. Nicolas, G.C.M.G., p. 300, vol. vii.

estimate the greatness of this naval victory, or the blessings it brought to England. For all that, the loss of the gallant hero Nelson was so keenly felt, that it was said, "Nor was there an individual in the "country who would not have given up the victory "to have saved the victim"—the victim whose last words were, "Thank God, I have done my duty."

Nelson's flagship, the "Victory," built at Chatham, 1765, in a dry dock, was constructed by Sir Thomas Slade, being one of a succession of vessels bearing that name in the Royal Navy since 1570. Her length of gun deck was 186 feet; keel for tonnage, 153 feet 1½ inch; breadth extreme, 51 feet 6½ inches; depth of hold, 21 feet 6 inches; tonnage, 2,164; her armament of 104 guns was made up of 32, 18, 13, and 12 pounders.*

This period also marks the climax in the career of sailing vessels. And here it would be as well to tell at once all about vessels depending solely on their sails; for, although such exist, they hold a very secondary place since the introduction of steam propulsion.

For some of the best sailing models and improvements in the construction of the war vessel, in the beginning of this century, we were indebted to the French and Spaniards, who showed considerably more skill as naval architects than we did; and, when one of their vessels was captured, she was closely copied. The skill in handling sailing war

* Letter from H. E. Rivers to the "Times," February, 1879, whose father was aide-de-camp to Lord Nelson in the battle of Trafalgar.

vessels at this time has never been surpassed, and it is generally considered to be the zenith of seamanship; for, from that time to the present, the demand for skilful seamanship has become gradually lessened with the entire revolution in shipping. During the war, which ended in 1815, there were 900 ships in commission.*

* Lind., vol. iii., p. 179.

CHAPTER VII.

THE line-of-battle-ships,* or the "wooden walls" of England, made their last grand and final show at the review held by the Queen at Spithead, when the British fleet was on the eve of departure for the Baltic, during the Crimean War. The men-of-war had reached perfection as regards size and appearance; and, although full-rigged sailing ships, they had auxiliary steam power. The "Duke of Wellington" was the flag-ship, and carried 131 guns, some being 68-pounders; while in Nelson's time 32-pounders were the heaviest. The longest three-decked line-of-battle ships were 260 feet, with a breadth of 61 feet; and frigates were 300 feet by 52 feet. Of this grand naval review, Mr. Farrer, Secretary of the Board of Trade, says, "I shall never "forget the beauty of the scene, when, late in the "afternoon, these magnificent ships came on with a "gentle breeze from the east, and the descending "sun shed a dying glory on their towers of canvas.

* First ship of the line built by contract was in 1755, when Messrs. Wells built the "Elizabeth," of 74 guns.—Lind., vol. iii., p. 180.

"It was a fit obsequy for the Hearts of Oak of "Rodney, Howe, and Nelson."*

No afternoon's holiday can give more general interest to those wishing to acquire knowledge, than paying a visit to the Royal Naval Museum at Greenwich Hospital, where there is to be seen a model of almost every description of war vessel, from the time of Henry VIII. to the present time, including all types of British ironclads.

Vessels constructed of wood are the heaviest, on account of the size of timber used, which has to be selected, so that the growth coincides with the form of the piece required. The lightest wood ships of any size are those constructed in America, under a patent of Mr. Griffiths, the builder of some of the famous clipper ships.† This invention, which the writer had the pleasure of seeing at work in the Boston navy yard, is a hydraulic apparatus for bending straight pieces of timber to the form required, thereby saving weight and expense. An instance proving the great durability of a well-built wooden ship was that of the "Holy Ship," built at Surat, and employed in taking Mahomedans to and fro from India to Mecca on their pilgrimage; she was described as an old ship in 1702, and was lost in 1777.‡

It was in 1761 copper sheathing was first used in the British navy, to protect the bottoms of vessels from marine animal and vegetable growths. The 32-gun frigate, "Alarm," was the first vessel so pro-

* Lind., vol. iv., p. 106. † The sailing ship, "New Era."
‡ Lind., vol. iv., p. 460.

tected; and, by 1783, nearly all the vessels in the navy were coppered;* being found injurious to the iron-fastening bolts, copper bolts were used instead. As regards some of the articles and terms,† with which many are all more or less familiar, such as "holystone," used for cleaning the decks, the name is thought to have come from using pieces of broken tombstones; others say, from the fact that sailors go on their knees to scrub the deck. "Sailors' slops," or ready-made clothes, are first mentioned in a MS. wardrobe list of Queen Elizabeth, where an order is given to deliver some fustian for "sloppe for Jack Green, our foole." The "dog-watch" commences at 4 p.m., and lasts two hours instead of four, for which reason, says Theodore Hook, "they were cur-tailed."

The East India Company's vessels were the best merchant vessels in all respects,—costing £40 per ton, against £25 per ton for privately-owned vessels. An East Indiaman, the "Earl of Balcarres," built in 1815, registered 1,417 tons, carried a crew of 130, including 78 seamen, being four times the number required for the sailing ship of the present day. The company's vessels were really men-of-war, and carried 18-pounders. The monopoly of this company ceased in 1814; and in 1858 they were deprived by Parliament of all power and privileges.

The Bill for abrogating the protective navigation laws of Great Britain received the Royal assent on

* James' "Naval History," vol. i., introduction.

† "The Sailor's Word Book," by the late Admiral W. H. Smyth.

26th June, 1849, after being in existence for two centuries. In both Houses there was the most determined and prolonged opposition by the Conservatives to the passing of the Bill, backed up by all the shipping interest of the country.

America, after the repeal of the navigation laws, made rapid strides in her shipping, which result the British shipowner attributed to the repeal; but it really arose from the splendid class of clipper vessels the Americans now turned out, which gradually monopolised certain trades; for, at the close of the war in 1815, American tonnage was less than that of Great Britain; in 1850 it had risen to 3,535,454 tons (including river and lake steamers), against 4,232,960 tons British.* This seemed a bad look-out for our shipping interests; but, after a time, by British perseverance, the famous China racing clippers were produced, which fairly beat the Americans. These long ocean voyages preventing at that time—viz., 1851—the use of screw steamers, which were being adopted in the mercantile marine. The depression in shipping was extreme, and it was not till 1852 that matters became brighter; and, since then, prosperity has followed the shipowner to the present time.

One remarkable wooden ship the Americans built was called the "Great Republic," at first of 4,000 tons, but, after her upper deck was removed, she measured 3,400 tons. Her length was 305 feet by 53 feet, by 30 feet depth of hold. She was the first vessel fitted

* Lind., vol. iii., p. 290.

with double topsails, and the largest sailing vessel in the world.

The cost of ships at this time rose from £15 to £21 per ton, and, for colonial-built ships, from £6. 10s. to £11; and freights became doubled. In 1847 a vessel built at Dantzig cost £10. 17s. per ton; in the United States, £12 per ton; in Great Britain, £15 per ton; £3. 10s. per ton added for a Baltic outfit.*

The China racing clipper, "Sir Lancelot," spread 45,500 square feet of canvas; her length was 197 feet by 33 feet 7 inches, by 21 feet depth; draught of water, 18 feet 8 inches; she carried 1,430 tons of tea at 50 cubic feet to the ton, 200 tons shingle ballast, and 100 tons cast kentledge between the limbers.†

Sunderland, in 1852, had not one steamer. From 1852 to 1862 steamers were built that displaced 4,000 sailing ships, each of 250 tons capacity.‡

At the beginning of this century sailing vessels had a length of only four times their beam; after which the Americans, with their famous clippers, increased this to five and six times. In 1853 Mr. W. S. Lindsay built an iron sailing ship, whose length was nearly seven times her beam. She met with so much prejudice that, on a slight accident occurring to her in the Downs, Mr. Lindsay transhipped the passengers, rather than incur the popular indignation. This ship was afterwards successful,

* Lind., vol. iii., p. 151. † Lind., vol. iii., p. 418.
‡ Lind., vol. iii., p. 402.

as many thousands have been since; and steamers are now running with a length as much as eleven times their beam.

Sailing yachts still hold their own; and, to those who are good sailors, the enjoyment they afford is unequalled. Some large yachts are fitted for auxiliary steaming; and, when a fair wind offers, they lift the screw out of the water, so as not to be a drag, giving all the excitement and speed of a sailing vessel. These yachts can make long voyages; and in such a one Mrs. Brassey (who has published her diary)* made a voyage, with her husband and family, round the world. According to Pepys, the Dutch, in 1660, gave Charles II. a yacht, called the "Mary," "until "which time," he says, "we had not heard of such "a name in England"†—meaning yacht.

About the largest and most important line of sailing ships now existing, is that of the New Zealand Shipping Company, Limited. This company was organised in 1873 by a number of merchants and runholders in the colony, who considered their interests were sufficiently important to warrant their having a line of vessels of their own, running regularly between the chief New Zealand ports and London. Partly by purchase, and partly by specially-constructed ships, the company has acquired a fine fleet of 17 high-class iron clippers, with an aggregate tonnage of 17,861 tons. As instancing their good sailing qualities, and the despatch with which they

* "Voyage of the Sunbeam."

† James' "Naval History," p. 6; Derrick p. 80.

meet in the colony, it may be stated that repeatedly the round voyage has been done under seven months. The capital of the company was entirely subscribed in New Zealand. The head office is at Christchurch, Canterbury, N. Z., with branches at all the New Zealand ports, and in London.

Before finishing with sailing vessels, must be mentioned the curious antiquated craft the Chinese still use, called junks, never varying in construction from the earliest times, showing the strict exclusiveness of the nation. A great contrast are the Japanese, who, during the last few years, have made rapid strides, throwing open their ports, building vessels and engines, and adopting all the principal features of western civilisation, with marvellous rapidity, unprecedented in the annals of history. They have now their own iron-shipbuilding, and engineering establishments. The Chinese are only just beginning to show symptoms of similar changes. In Forster's "Life of Dickens" will be found an amusing and descriptive account of a visit to the first Chinese junk that found its way to London.

CHAPTER VIII.

WE now come to the "steamship," which traverses all navigable waters, and of which Mr. Lindsay says, "Of all the inventions of man, is "the mightiest harbinger of peace and good will "among nations the world has ever seen";* and of which Mr. Ralph Waldo Emerson speaks as follows: "The ship, in its latest complete equipment, is an "abridgment and a compend of a nation's arts; the "ship steered by compass and chart; longitude "reckoned by lunar observation and by chronometer; "driven by steam; and in wildest sea-mountains, at "vast distances from home,—

"'The pulses of her iron heart
Go beating through the storm.'

"No use can lessen the wonder of this control by so "weak a creature of forces so prodigious. I remember I watched, in crossing the sea, the beautiful "skill whereby the engine, in its constant working, "was made to produce 200 gallons of fresh water "out of salt water every hour, thereby supplying all "the ship's want."†

* Lind., vol. iv., p. 56.

† "Society and Solitude," Essay on Civilisation, Ralph Waldo Emerson.

It is an interesting study to trace all the early experiments in steam, from the days of Hero of Alexandria (120 B.C.), down to its first adoption in vessels for the purposes of propulsion, at the end of the 18th century, when several attempts were made to bring it into use.

The first practical steam-boat (so considered by the best authorities) was the "Charlotte Dundas," constructed by Symington in 1801, which worked on the Forth and Clyde canal, in which company Thomas, 1st Lord Dundas (Symington's patron), was a large shareholder. This steam-boat had a stern paddle-wheel, and made a successful trial trip, March, 1802. It must be borne in mind, that the Americans may fairly claim to have had a working steam-boat contemporary with Symington's; but his vessel seems to have given the best results. Robert Fulton, an American, in 1798, tried, with success, a boat propelled with a steam-engine, and a four-bladed screw-propeller; and in 1817 he built and engined the "Clements," 130 feet in length, 16½ feet in width, and 18 horse-power. This vessel may claim to be the first passenger steamer of any pretensions, as regards size, comfort, or length of voyage: undoubtedly marking the commencement of the era of steam navigation.

In 1811 Mr. Henry Bell, of Glasgow, constructed the steamer, "Comet," 40 feet long, by 10½ feet in width; horse-power, 4; draught of water, 4 feet. This is considered to be the first passenger steam-boat built in Europe. It plied, in 1812, on the Firth

of Forth, a distance of 27 miles. The little engine of this vessel is now in the Patent Office Museum at South Kensington. It must also be mentioned that this small steamer was built on the Clyde, now the greatest shipbuilding depôt in the world, building more vessels than all the other ports in Europe combined, England excepted.* In 1874 the number of vessels built and launched on the Clyde was 196, of a tonnage of 262,430, of the value of £6,500,000 sterling, although the price per ton had dropped nearly £3 since the previous year.

From the appearance of the steamer, "Comet," to 1815, when the first steamer appeared on the Thames, there were several built, and in 1816 they seem to have grown into public favour, for in that year nearly 600 persons made, in one day, excursions on the Clyde. In 1817 the son of James Watt purchased the "Caledonia," and took her to Holland—the first time the English Channel was crossed by a steamboat—her average speed being 7½ knots.

In 1819 the Admiralty built their first steam-vessel, also named the "Comet," her length being 115 feet, breadth 21 feet, and draught of water 9 feet, with two engines of 40 horse-power, made by Boulton and Watt, of Birmingham.

The "Rob Roy" steamer was built by Mr. William Denny, of Dumbarton, in 1818, to the order of Mr. David Napier; this gentleman having given special attention to the development of the marine engine; the firm of Robert Napier and Sons becoming after-

* Lind., vol. iv., p. 69.

wards one of the most eminent firms in engineering and shipbuilding in the world. The "Rob Roy" was only 90 tons burthen, and carried the mails and passengers for some years between Glasgow and Belfast.

In 1822 the steamer, "James Watt," was built for the traffic between Leith and London. She was then the largest steamer, being 448 tons, and with engines of 100 horse-power, by Boulton and Watt. In 1826 the steamer, "United Kingdom," was built by Mr. Steele, of Greenock, for the trade between London and Edinburgh. She was 160 feet long, and of 200 horse-power.

Up to 1830 every description of vessel had been built of wood, and fears were expressed that there would not be sufficient oak for vessels of the Royal Navy. Some one proposed substituting iron for wood. "What a howl of derision the public raised."* They could not understand that an iron vessel could be made to float; in fact, the chief naval architect at one of the dockyards said, with indignation, "Don't talk to me about iron ships, it's contrary to "nature."† However, we know now, that with the exception of a few colonial-built ships and coasters, nearly all vessels are built of iron; and, without that material, it would have been impossible to have built the splendid ironclads and mail steamers of the present time.

An ordinary iron vessel is 30 per cent. lighter than a wooden one; and, as a structure, possesses considerably more strength in all directions. An accident

* Lind., vol. iv., p. 83. † Lind., vol. iv., p. 84.

happening at the launching of the iron steam-ship, "Prince of Wales," at Blackwall, in 1845, whereby the vessel became suspended for a length of 110 feet without injury, confirmed the late Robert Stephenson in his ideas for building a wrought-iron tubular bridge, and he, working with the aforementioned steamer's builder, the late Sir William Fairbairn, Bart., produced the celebrated Britannia Tubular Bridge.* The advantages are so great in favour of iron vessels, that there is scarcely one offset, even with the fact that iron vessels foul sooner than copper-sheathed wooden ones. In 1809 Richard Trevethick and Robert Dickenson spoke about a scheme for building iron vessels, and the latter took out a patent in 1815. However, it was not till 1818 that the first iron vessel, called the "Vulcan," was built, near Glasgow. In 1875 this vessel was still conveying minerals on the Forth and Clyde canal. The first iron steam-boat was named the "Aaron Manby," built in 1821. In 1824 Mr. William Laird established the Birkenhead iron works; in 1829 he built the first iron vessel on the Mersey: thus commencing what has gradually become one of the largest iron-shipbuilding establishments in the kingdom.

Even in 1830 the idea of introducing steam-vessels into the Royal Navy was considered so improbable, that the Duke of Wellington said† (in connection with the proposal made to convert Mount's Bay into a great naval station) that, "Steam navigation has

* "Lives of George and Robert Stephenson," by Smiles, p. 328.

† "Despatches and Correspondence of Arthur Duke of Wellington,' vol. vii.

" made a great alteration in respect to all our har-
" bours, but I don't mean to say that these vessels
" can be used for the purposes of war," explaining that he referred only to their use in towing vessels, even ships of the line, out of harbour, notwithstanding contrary winds. Also Admiral Beechey, an officer of very superior attainments, said in 1830,
" That he did not believe that the Royal Navy of the
" future ever could consist of steamers! Nor could
" he endure iron ships." *

In 1832 Messrs. Laird built two vessels for exploring the African rivers, constructed with iron plates ¼-inch thick in the bottom, and ⅛-inch in the sides.

The building of the famous iron steamer, " Great Britain," was commenced in 1839 by Mr. Patterson, of Bristol, and launched 19th of July, 1843. She stranded shortly afterwards in Dundrum Bay, where she remained during a whole winter, proving most decidedly the great strength of iron vessels. This steamer until lately was making voyages between Liverpool and Melbourne with great regularity (the passage averaging 60 days), owing to her having steam power as an auxiliary, when her large spread of canvas was not available. As a safe, good sea-boat she has been a great success, although her model is of a very different type to those of the large iron steamers now built, her length being rather over 5¾ (5·80) times her breadth, and many steamers being now built of a length from 10 to 11 times their breadth.

* Lind., vol. iv., p. 106.

CHAPTER IX.

IRON vessels were but slowly adopted in the Royal Navy; and it was not until ironclads came into use that their great qualities caused them to supersede the "wooden walls." Now the vessels of the British Navy, with the exception of a few cruisers, are all built of iron. The first steam-vessels were propelled by paddles. Those paddle-wheels having floats, which, in entering and leaving the water, acted like oars, and therefore called "feathering," were the most successful, and are now used for all paddle steam-boats at the present day. But, for all ocean-going steamers, the paddle has given way to the screw-propeller, which was first adapted to a sea-going craft in May, 1804, by Mr. Stevens, of the United States. It was not till 1836 that real efforts were made to bring the screw-propeller prominently forward. This was accomplished in London by Captain John Ericsson, a Swede, with a small steamer, called the "Francis B. Ogden."

The Steam-ship Propeller Company was started on 29th July, 1839, to purchase the patents of

Mr. T. P. Smith. They built the steamer, "Archimedes"; burden 237 tons; her fastest speed was 9¼ knots. This determined the success of the screw propeller; but it was not for eight years afterwards that the British Government fully realised its importance. It is now universally adopted. In 1839 the screw-steamer, "Robert F. Stockton," a vessel only 70 feet in length, crossed (principally by sailing) the Atlantic, and for many years afterwards worked as a steam tug on the river Delaware.

We are indebted to the Americans for first introducing vessels modelled with fine lines, doing away with the old-fashioned bluff-bowed craft, sometimes called "bruisers." Their paddle-steamers on the lakes and rivers are remarkable craft, to give a detailed description of which would take many pages. They are well entitled to be called floating hotels. Any one who has voyaged in the steamers running from New York on the Hudson river, or by the Sound steamers going to Fall river, can testify to the magnificence and luxury of these extraordinary vessels. Some of these paddle-boats are 380 feet in length, and of very light draught of water; and, although constructed of timber, they are very strong and solidly built. The Americans have certainly the credit for having produced the finest lake and river steamers, but they have never been able to compete successfully with Great Britain in ocean steam navigation.

On the 14th of December, 1835, Dr. Lardner, the author of many scientific and engineering works,

publicly stated in Liverpool, that, "As to the pro-
"ject, however, which was announced in the news-
"papers, of making the voyage directly from New
"York to Liverpool, it was (he had no hesitation in
"saying) perfectly chimerical, and they might as
"well talk of making a voyage from New York or
"Liverpool to the moon." Dr. Lardner was not the only eminent man who expressed himself after this fashion. It shows us how careful one ought to be before expressing opinions about what is possible or impossible, it being a well-known axiom, that there is nothing impossible for engineering to accomplish, as long as there is no attempt made to transgress natural laws.

The American steamer, "Savannah," a vessel of 300 tons, arrived, in 1819, at Liverpool from Savannah in 31 days, partly by steaming, and partly by sailing. The next noticeable event was in 1829, when the English-built vessel, "Curaçoa," of 350 tons, and 100 horse-power, made successful voyages between Holland and the Dutch West Indies. On the 13th August, 1833, the steamship, "Royal William," sailed from Quebec, and arrived at Gravesend on the 11th September. The instances here enumerated proved that steam vessels could not make lengthy voyages entirely by steaming; and it was no doubt this fact that called forth Dr. Lardner's verdict in 1835. But in 1838 this very opinion was dispelled by the steamer, "Sirius," of 700 tons, and 320 horse-power, proving the profitable practicability of steaming across the Atlantic. The steamer, "Great Western,"

followed, being the first steam-boat specially constructed for the Atlantic trade. She was a wooden vessel, built by Mr. Patterson of Bristol, length 212 feet, and 1,340 builders' measurement. The largest vessel now regularly crossing from Liverpool to New York is the Inman iron screw steamer, "City of Berlin," length, 488½ feet; beam, 44 feet, and extreme depth, 35 feet; gross tonnage, 5,490 tons. In this same year (viz. 1838), Liverpool sent out her first steamer, the "Royal William," which made the voyage to New York in 19 days, and the passage home in 14 days. The steamer, "Liverpool,"—length, 235 feet; beam, 35 feet; depth of hold, 21 feet; and 1,150 tons—followed. She was built for Sir John Tobin, by Messrs. Humble and Melcrist, and purchased by the Liverpool Transatlantic Steam Company, an association branching out of the Dublin Steam Company She accomplished the passage out in 16½ days. The engines, of 468 horse-power, were by Messrs. George Forrester and Company; some of her standing rigging and the funnel stays were of wire.

To mention the different steamship companies that sail their noble vessels to every part of the world, would almost amount to a simple repetition of the history of all the great steamship lines, and the characteristics of their vessels. Therefore, if we take the Cunard Company as being the most successful steamship company existing, and give a sketch of its career, it will embrace all the leading particulars of the other lines.

In 1838 the British Government became satisfied

as to the superiority of steam over sailing-vessels, and advertised for tenders to carry the North American mails. Mr. Samuel Cunard's was the most favourable; and when the steamer, "Britannia," sailed from Liverpool, the 4th July, 1840, the well-known Cunard Line commenced its career, which, up to the present time has been the most successful line of steamships existing. Their great boast is of having never lost either a passenger's life, or a letter. This great result has not been achieved by what many people term "luck," but from a steady, persevering, and well-organised course: never sparing expense, trouble, or skill to arrive at the best results.

The Americans were not slow in trying to contest the American trade; and, in opposition to the Cunard steamer, "Britannia," they started the steamer, "Washington"; and in a race the former beat the latter by two days. Some time after the Americans started the well-known Collins Line, a fleet of wooden paddle-steamers. After many vicissitudes, and a prolonged struggle, they were run off the trade, in 1858, by the overwhelming competition of the British steamers; and for many years there was no American-owned steamer regularly crossing the Atlantic; and, at the present time, there is only one line of American steamers flying the United States flag running to Liverpool.

When the Cunard Company launched their iron paddle-steamer, "Persia" (a vessel 350 feet in length, 45 feet in breadth, 30 feet depth of hold, 3,766 tons register, and 3,600 indicated horse-power), she was

their 27th steamer. The "Persia" was not alone the largest vessel afloat, but she marked the wonderful improvements that had been made within a generation, since the building of the first small paddle-steamer "Comet." The Cunard steamer, "Scotia," was afterwards built, and, until very lately, ran between Liverpool and New York, except during the winter months. She was the last paddle-steamer to regularly cross the ocean; kept on as being a favourite vessel with passengers, whose ideas were that she was more comfortable and safer than any other vessel. For this reason, places were booked, and high fares paid, many months before the date of sailing. But, whatever advantages the "Scotia" may have possessed, she has been entirely superseded by the splendid screw-steamers, now daily leaving for the United States. The Cunard Company's first screw-steamer, the "Russia," was built in 1862.

In order to thoroughly comprehend the vast improvement in the space of 37 years, one need only compare the Cunard steamer, "Britannia," with the White Star steamer "Britannic." The former's average passage was 14 days, 18 hours, with a consumption of fuel of 544 tons, or daily consumption of about 38 tons, with an average cargo of 225 tons: giving 35 to 48 cwt. of coal per ton of cargo. The average speed was 8.3 knots; consumption per knot, 3.8 cwt. Indicated horse-power, 740; consumption per horse-power, 4.7 cwt.; displacement, 2,050 tons. On the other hand, the "Britannic" displaces 8,500 tons. In 1877 her average passage between Liverpool and

New York was 7 days, 10 hours, 53 minutes, with a daily consumption of 100 tons, or a total of 745 tons; cargo 3,350 tons; consumption per ton of cargo, 4.45 cwt. Average speed, 15.6 knots; consumption per knot, 5.3 cwt. Indicated horse-power, 4,920; consumption per horse-power, 1.9 cwt. The result being, that the "Britannic" carries 15 times as much freight across the Atlantic, in half the time, with one-and-half times less coal, than the "Britannia" consumed in 1840. To go a step still further back, we find the clipper sailing ships in 1839 took 33¾ days outward, and 22¼ homeward, the fastest being 23 days out, and 17 home.

The latest addition to the Cunard Company's fleet is the screw-steamer, "Gallia," built by Messrs. James and George Thomson, Glasgow; her dimensions are length over all, 450 feet; breadth, 44 feet; depth, 36 feet; tonnage, 5,200; nominal horse-power of engines, 700. At the launch of this vessel, Mr. John Burns, one of the owners, said, "That this "vessel made the 165th steamship that had been "built for his firm, whose fleet, since its commence- "ment, aggregated upwards of 180,000 tons of steam- "shipping, propelled by 50,000 horse-power. They "had been thought slow in adopting improvements, "but they wished to be cautious and see things "tried first. He wished to say, with great caution, "and with a profound belief in a higher power than "that of man, that any measure of security attained "by the Cunard Company was due, not to good "luck or chance, but, firstly, to a most careful

"equipment and surveillance of their ships and "machinery in course of construction, and, secondly, "to a rigid discipline among their officers and crews, "as well as a constant supervision of their ships "when engaged in active service."* It is these last few lines which should be laid well to heart; for, if only more universally carried out, we should not hear of the wholesale losses that occur from time to time; and it is only known to the initiated and earnest few, how stolidly obtuse many owners are to the fact, that it may pay best, in the long run, to give heed to the experience of the Cunard Line.

* "The Times," 13th November, 1878.

CHAPTER X.

IN 1825 the paddle-steamer, "Enterprise," was the first steamer to make its way to India and the Cape. She was only 122 feet in length, and had the peculiarity of having a copper boiler made in one piece, weighing 32 tons, and costing £7,000. This successful attempt caused others to be made, in which the East India Company took part.

The vessels of all the well-known lines of steamers, generally speaking, are much the same; but the steam-ships of the White Star Line, commenced in 1870, deserve special mention, as they, in many particulars, have made great innovations upon the usual liners. They were the first to adopt a narrow beam in an Atlantic vessel with perfect safety and comfort, and also increased speed, with a proportional economy in fuel. The luxurious cabin-accommodation is placed in the centre of the vessel, thereby lessening the pitching motion. All the details and fittings are so well considered and executed, that they would grace the finest mansions; and the workmanship, as regards the hull and engines, is as fine as can be procured.

These vessels were built by Messrs. Harland and Wolfe, Belfast. The "Britannic," of this line, is 455 feet in length, 45 feet 3 inches in breadth, and 34 feet depth of hold; she carries 1,300 passengers, and 150 crew; average speed, 15 knots per hour; and consumes from 75 to 80 tons of coal per day. Her cost (being, of necessity, built without contract), was about £200,000.

The Royal Mail Steam Packet Company was started in 1841, and in October, 1877, possessed a total tonnage of 51,152 tons.

The Peninsular and Oriental Steam-ship Company had a gradual rise from very small beginnings, and did not attain its full title and pre-eminence till 1839, when Messrs. Wilcox and Anderson, the originators of the Peninsular steam-ship lines, undertook to run steamers to Alexandria, in connection with steamers running between Suez and Bombay. This line is, perhaps, the most numerous of all; and their steamers are very similar in construction and arrangement to those of the other great lines. Their fleet, in January 1879, consisted of 44 sea-going steam-ships, and 4 subsidiary vessels; total tonnage, 119,779; horse-power, 20,731; and 2 vessels building. The Government troop-ship, "Himalaya," once belonged to the Peninsular and Oriental Steam-ship Company, and deserves special mention for the amount of work she has done in her career, which commenced in 1852, and will compare favourably with any steam-ship afloat, showing the capabilities of a well-constructed iron vessel.

The Orient Line was started in June, 1877, through Messrs. Anderson, Anderson and Company, sending the s.s. "Lusitania" direct to Australia from London. Under the joint managership of Messrs. Anderson, Anderson and Company, and Messrs. F. Green and Company, the line was formed into the Orient Steam Navigation Company, Limited, in 1878. They now despatch their fine steamers to Melbourne, Sydney, and Adelaide monthly, direct from London. Though they have no subsidy, the letters and newspapers carried by this line are delivered in less than the contract time of the Peninsular and Oriental Company, viâ Brindisi. Indeed, if the Post Office representatives in Egypt forwarded the letters which come by the Orient Company's steamers from Australia, as promptly as they do those which come by the Peninsular and Oriental Company's steamers, there would be an average gain to the public of about ten days. The Orient steamers take about 26 days to Suez, and the regular mails take seven days thence to London. The Orient steamer, "Cuzco," has done the passage from Adelaide to Plymouth in 37 days, 10 hours; the quickest on record. The outward passage is by the Cape of Good Hope; the homeward one, viâ the Red Sea and the Suez Canal. The last addition to this fleet is the s.s. "Orient"—length, 460 feet; breadth, 46 feet, 8 inches; and depth of hold, 37 feet 8 inches; gross tonnage, 5,400; indicated horse-power, 5,400; speed at the measured mile, 15½ knots. She was built and engined by

Messrs. John Elder and Company. The steamers of this line are, according to Admiralty requirements, well-subdivided into watertight compartments. It is also noteworthy that this company, with their full-powered steamers, carry third-class passengers, as well as first and second, between England and Australia.

The Union Steam-ship Company, Limited, was first formed in the year 1854, under the title of "The Union Steam Collier Company," with a capital of £60,000, and a fleet of five steamers, of the aggregate tonnage of 2,327. Although the original intention was to carry on the coal trade, they were first employed between Southampton and the Mediterranean, and ultimately chartered, at the time of the Crimean War, in the British and French transport service. In 1856 the company was registered as "The Union Steam-ship Company, Limited." The following year this company obtained an annual subsidy of £30,000 for five years, for a monthly mail service between the Cape of Good Hope and Southampton and Plymouth. In 1858 the sum of £3,000 was added to the yearly subsidy, for calling at St. Helena and Ascension for mails on the homeward voyages. At the expiration of the first contract, a second was entered into with the British Government for seven years, the annual subsidy amounting to £19,700. In 1864 the service was extended to Mauritius, the Union Company receiving subsidies from the legislature of that island. From the 1st of October, 1865, a seven years' mail service was entered into

with the Natal Government. In 1866 the company arranged for a direct service to St. Helena, and also concluded a contract for a monthly postal service between Mauritius and Point de Galle; but in 1868 this was discontinued, and Natal was the extent of the company's operations. In 1867 a semi-monthly mail service, between England and the Cape of Good Hope, was arranged with the Postmaster-General. A Parliamentary controversy arose in 1873, over a postal contract requiring three despatches monthly, with a reduction of time from 37 days to 30; and, secondly, for a four weeks' service between Cape Town and Zanzibar. These arrangements required enlarged operations and expenditure; but the House of Commons did not confirm the Government contract, and the existing contract was revived, and continued in force to June, 1876. The Zanzibar contract was finally settled for eight years at £20,000 per annum. The Union Company now, however, performs three mail services per month, instead of two; and, although the contract gives 37 days, the steamers now frequently do it in 10 to 12 days, [redacted] less. The company now possesses a fine fleet of 17 first-class steam-ships, which accomplish the Royal Mail Service between Southampton, Plymouth, and Cape Town with great regularity, their steamer, "German," having done the passage out in 19 days, 8 hours, and home in 20 days, 1 hour.

The Donald Currie Royal Mail Steam-ship Company is the only other regular line of steamers in the same service. These two companies afforded

the British Government great and important services, in quickly carrying despatches to the nearest telegraph station (Cape de Verde), between the Cape of Good Hope and England; also conveying troops and stores in the emergencies which arose at the commencement of the Zulu War.

Another of the well-known services to the East is the Ducal Line of Steamers which run to Calcutta, Colombo and Madras, viâ the Suez Canal. Messrs. Carlyle Brothers formed this line, on the opening of the Suez Canal, being one of the first firms to recognise the importance of the event, and the revolution it would cause in the carrying trade between London and the East, in which they had had already a large experience with their fleet of sailing vessels. The vessels of this company are, in many respects, similar to the White Star steamers, having four masts, one funnel, and a luxurious saloon amidships for about 80 first-class passengers, no other class being carried. They are likewise large carriers, and good sea-boats. There are at present six steamers, all named after some of the best-known Dukes in the British Peerage. They are built on the same lines and model, each being of a gross registered tonnage of 3,015 tons, and engines of 500 horse-power nominal. The sailings are fortnightly, from the South West India Docks, and the average passage is, from London to the Canal, 13 days; from Suez to Colombo, 13½ days; from Colombo to Madras, 3 days; and from Madras to Calcutta, 3½ days.

CHAPTER XI.

THE last few years have seen a remarkable improvement in the steam engines used in propelling vessels. Before 1856 most engines had two cylinders of equal size, both using steam of about 30 lbs. pressure on the square inch, and consuming, in the generation of this steam, about 195 lbs. of coal, in twenty-four hours, for every actual or indicated horse-power developed. The compound-engine then came gradually into use, also with two cylinders, the one being about half the diameter of the other. In these engines steam is used at high pressure, reaching 100 lbs. on the square inch. This high-pressure steam is expanded into the larger cylinder, giving about the same power in the larger with reduced-pressure, as it did in the smaller cylinder with the high-pressure steam, thereby combining high and low-pressures: hence the term compound-engine.

These engines consume about one-half the quantity of coal used in the old fashioned marine engine; so it may be imagined what an immense saving to steam

shipping this means. The Pacific Steam Navigation Company, and Mr. Alfred Holt's, Liverpool line of China steamers, were the first companies to bring this improvement prominently into successful working form. The compound-engine is now in general use, both in the Royal and Mercantile Navies. In 1871-72 the writer was in America, superintending work being done to a British iron screw-steamer, with compound engines of ordinary make. These engines were deemed quite a novelty on the other side of the Atlantic, as, even to this late period, there had been scarcely any attempt to adopt this improved type. The United States Government had one or two small revenue steamers fitted with compound engines, but they felt in no way secure as to their general adoption, and therefore appointed a commission of engineers to go into the matter scientifically and practically. The president of the commission observed to the writer, "That, although the "British engineers had achieved certain results, "apparently economical, still they had no scientific "basis upon which to proportion the cylinder, &c., "so as to give the best results, every manufacturer "using different sizes according to his own judg- "ment and experience." It may here be mentioned that marine engineering and ship building have advanced, not so much owing to scientific investigation, but from gradual improvements; experience discovering the weak points.

The term "horse-power" is frequently used as applied to engines. It would perhaps, be as well to

explain its meaning; James Watt, the perfecter of the leading features of the steam-engine in its present form, used this term as a standard of power, as, prior to the use of steam, our friend the horse gave us the power most generally used. Watt estimated that 33,000 lbs. raised one foot per minute was equivalent work to that of one horse. Horse-power has the following significations—nominal, indicated, and effective. The first was principally used for the commercial rating of the engine, and, since the introduction of the compound-engine, it has almost become obsolete. The second is the actual power developed, and includes the merits of the ship, the engine, and the propeller. The effective horse-power is that portion of the indicated power actually required to drive the vessel; and, according to the late Mr. W. Froude, M.A., F.R.S., the former is at high speeds 37½ per cent. of the latter, or the latter is 2.7 times the former.*

A few particulars of the steam-ship, "Great Eastern," the largest vessel ever built, will form a suitable finish to this sketch of shipping in general. She was designed by the late Mr. I. K. Brunel, and built by Mr. John Scott Russel, at Blackwall, who also made the paddle-engines. The screw-engines were made by James Watt and Company, of Birmingham. The building was commenced 1st of May, 1854, and, after repeated attempts being made to launch her broadside to the river, she was so far advanced that, with the rise of the tide, she floated

* Transactions Inst. N. A., 1876.

off her launching-cradle the 31st of July, 1858. The idea in building such an immense vessel was, that she should be able to carry sufficient coals for a voyage to Australia and back, besides a large cargo, and a great number of passengers. The dimensions of the "Great Eastern" are,—length on upper deck, 692 feet; breadth, 83 feet; depth extreme, 58 feet; nominal power of paddle-engines, 1,000 horse; of screw-engines, 1,600 horse; the actual power developed of both sets of engines equals 11,000; tonnage, 22,500; number of plates in hull, 30,000; rivets for fastening the same, 3,000,000; and weight of iron used in the construction, about 10,000 tons.

The hull of the "Great Eastern" is built on the strongest and safest principles possible in the construction of iron ships. She is a double vessel up to her load-line of 30 feet, and is also divided into 10 water-tight compartments; her upper deck at the sides is built double, or on what is known as the cellular system: similar to the Britannia Tubular Bridge, which carries the railroad across the Menai Straits.

Her proposed accommodation was for 4,000 passengers, and, on an emergency, for 10,000 soldiers, but her cabins were never arranged (including all classes) for one half the number; and it was only in 1867, when this vessel was chartered to carry first-class passengers from New York to France, for the great exhibition of that year, that the writer had the planning and arrangement of first-class cabins

throughout the entire vessel, numbering 594 state rooms, and 2,393 berths; the dining accommodation was also made to give this number of passengers a dinner *à la carte*. The grand saloon, from the time it was first furnished, deserved its name, as from its height and magnificent appearance, one might fancy it to be in a palace.* The "Great Eastern" was the first vessel fitted with a steam-steering gear, made by Messrs. George Forrester and Company, of Liverpool, who also supplied the vessel with a set of new boilers to the screw-engines. By means of this steam-steering gear, one man, located between the paddle-boxes, could steer this huge vessel more effectually than did 20 to 30 men before with the old arrangement. The steam-steering apparatus has now been adopted in all large vessels of Royal and mercantile navies, and is the invention of Mr. John McFarlane Gray.

The "Great Eastern" has gone through many vicissitudes; amongst the number, commercial failures. But she is a triumph for engineering; her successful laying of the Atlantic Telegraph Cable, under the scientific and able command of Sir James Anderson, fully justifying the assertion that there is no other vessel which could have so successfully laid the long submarine telegraph cables, being the first vessel thus to link together distant nations. A short time ago the writer surveyed this remarkable vessel at Milford Haven, and found her

* Jules Verne's tale of "A Floating City" gives a good description of this vessel, as fitted in 1867.

very little worse for all she has gone through. On the 50,000 square feet of submerged plating were found 300 tons* of living marine animals; sufficient to give a cargo to a good-sized collier brig.

The double hull and water-tight compartment system is the greatest advantage we derive in having iron ships, as it gives the greatest strength with the least possible weight of material, and also produces the safest vessel afloat. All the large iron-clad men of war are built on this system.

* "The Times," 21st August, 1875.

CHAPTER XII.

STEEL used for construction in ship-building and marine boilers is now fully recognised by the Admiralty and Lloyds, as well as by all practical and scientific men who have given thought to, or have had experience in, its use. In 1859 Mr. Henry Bessemer (now Sir Henry) brought out his invention for the making of cast or "crucible-steel." The process is as follows:—The iron is first melted in a Bessemer converter or crucible, and, when in a molten state, some impurities are consumed by air being driven through the fluid mass. After this a proportionate amount of carbon is added, in the shape of "spiegel-eisen," or more generally by "ferro-manganese," which gives the required hardness or temper to the iron, thereby forming steel. The metal is then poured into ingot-moulds, the ingots being then ready for the rolling-mills or the forge.

A large amount of tonnage in vessels, constructed of Bessemer cast-steel, was built from 1859-1865,—being of a scantling ⅓rd lighter than if they had been

of iron. In August 1864, Mr. King, the chief engineer of the American navy, paid a visit to the royal dockyards of England and France, and also to the most notable of the private shipbuilding yards. In his report to his government, he remarks, on the steel-shipbuilding works of Messrs. Jones, Quiggin and Company, Liverpool, "The vessels built here," (says the report) "are, with few exceptions, constructed "entirely of steel, the frames, beams, and masts all "being rolled steel, manufactured by the Bessemer "process, and at Sheffield and in Germany, &c. The "quality of steel used in the vessels was tested in my "presence, the same being selected from the pile by "myself, and was found to possess a ductility and "homogeniety not found in iron plates." In this same year the firm turned out 12,000 tons of steel-shipping. This tonnage included several blockade runners, many of which ran in and out of the ports of the Confederate States of America successfully, making a net monthly profit of over $91,000. Steel-shipbuilding may be considered to have at last received an almost full acknowledgment of its worth, the government having decided on building an improved "Inflexible" entirely of steel, with the exception of a few frames, &c.

Although steel-shipbuilding met with considerable success from the first, (there being several large steel vessels still doing good service) it so happened that there was "steel and steel," or, in other words, a great deal of uncertainty existed as to the temper of the material which different steel manufacturers

turned out under the Bessemer process. Much uncertainty, also, was shown by some builders, in its use; the consequence was, steel became so unpopular, that merchant ships were no longer built of it. The Admiralty, Board of Trade, and Lloyds, would not countenance it. This uncertainty in the temper of Bessemer cast-steel arose from the difficulty of making each charge in the converter of uniform quality, owing to the variations of the carbon introduced, and from not knowing the exact time to draw the charge.

It must here be mentioned that Bessemer cast-steel, although proscribed for shipbuilding purposes, has worked an advantageous revolution in many other directions, especially in railway engineering.

In 1875 the Siemen's-Martin's steel came prominently forward. This was manufactured by the "open hearth process in contradistinction to the crucible process." This method purifies the metal to some extent from sulphur and phosphorous—far more so than the Bessemer process. The result is that "mild-steel," as it is technically termed, is coming into general use. It possesses great ductility, with great tensile strength and general uniformity in its composition. This steel may now be manufactured at a comparatively cheap rate; and the extra first cost of a vessel is covered by the increased facility for earning additional freight.

After all the uncertainties of manufacture had been overcome, an opinion still prevailed that steel deteriorated quicker than iron. This is now set at

rest, as it can be authoritatively and most positively proved, that steel is superior, even in this respect, to iron.

Mr. Martell, the Chief Surveyor to "Lloyd's Register," stated that in 1877-78 there were submitted for their committee's approval, particulars of 5,000 tons of sailing ships, and 18,000 tons of steamers, to be built of steel; and several large passenger steamers have since been built of it. It may now be stated with certainty, that steel is the right shipbuilding material, and its use will increase yearly. Steel has, up to the present, been made from hematite ore brought from the north-west coast of England. Late discoveries and inventions (especially those by Messrs. Thomas and Gilcrist) prove that the great Cleveland ironstone district can be turned to account, as its pig-iron, purified from sulphur and phosphorous, becomes fit for the manufacture of steel.

Now that steel is again beginning to be adopted in the construction of vessels, still greater strength is gained, and less material required. This is another great scientific and practical improvement, and it is hereafter noticed how extensively the Admiralty is using it, having already constructed, at Pembroke, the two steel corvettes "Iris" and "Mercury."

Before touching on the important section of armoured vessels, the following varieties must be noted, viz., composite vessels, the framing and internal construction of which are generally of iron or

steel, with outside planking, sheathed and coppered, as is usual with ordinary wooden vessels. This description of vessel does not possess sufficient advantages over iron vessels, from a commercial point of view, for general adoption in the mercantile marine. The British Admiralty has given this system more encouragement, and Messrs. Elder and Company have constructed six corvettes for them, all the inside work of steel,—the outside of teak and elm.

The principle of the double steamer, "Castalia," built for channel service, and its improved successor, the "Calais-Douvres," built by Messrs. Leslie and Company, is that of the catamaran of the East Indies, in which the outrigger forms the steadying medium to a very long and narrow canoe.

Double or twin-screw steamers are used for special purposes, but, from the room and weight required for the double set of engines, have never received much favour as merchant vessels; but, for the recent armour-clads, it is invaluable, as it enables quick evolutions, even without aid from the rudder; and, in case of a break down of one set of engines, the vessel is not disabled. It also avoids the risk attendant upon the manufacture of large cylinders.

The mercantile marine of the United Kingdom is supervised by the Marine Department of the Board of Trade, which issues rules and regulations as regards the construction of vessels and marine engines, as well as for their working. The Board of Trade was first projected by Charles II in 1668, and became a permanent establishment in 1696.

Lloyd's Register of British and Foreign Shipping was the first step taken towards adopting a systematic classification of shipping, as a means to good construction and proper equipment, thereby offering a guarantee for the insured and insurers, or underwriters. Their earliest book of classification dates 1764-65, and furnishes the following particulars: ship's name, master's and owner's names, ports of trading, tonnage, when and were built, number and kind of guns, number of men, and the class of ship. To class in Lloyd's, or in any other underwriters' register, is not compulsory. The Liverpool underwriters also established a register book in 1862, and were the first to enter a steel vessel, although only experimentally, in 1864. This vessel, the "Altcar," of 1,250 tons, is still running, and, with other steel vessels of good size, built about the same time, offer the most conclusive evidence, that reliable vessels, even in the earliest days, could be built of steel.

A Royal Commission on Unseaworthy Ships (1873-74) was appointed, in answer to the earnest appeals of Mr. Samuel Plimsoll, M.P. for Derby. Their report describes seaworthiness as "That condition "of a ship which comprises good design, good con- "struction, being well equipped, well stowed, well "manned, and navigated." There is no doubt that, owing to the agitation caused by Mr. Plimsoll, and the aforementioned report, there has been much good done for shipping throughout the United Kingdom; and unscrupulous and selfish ship-owners have

" designer of war-ships in Europe, whose success " has been so remarkable, Mr. Dupuy de L'Ome, is " of this opinion, and constructs the ships that are " to form the French line-of-battle of wood, in pre- " ference to iron." The French naval constructor, being especially in favour of wooden-built armoured vessels, has caused them to be maintained so long in the French navy; but time has proved that they cannot last with the great weights attached to their sides, besides showing longitudinal weakness, and soon giving signs of rotting.

The "Warrior" (dimensions, 380 feet in length, by 58 feet 4 inches) was the first sea-going armour-clad of the British navy, and contemporary with "La Gloire." She is an iron-built ship, as also her sister vessel, the "Black Prince," and the only iron-clad vessels that can claim the beauty that was once the pride of the naval architect and seaman. From that time vessels of the various classes of armour-clads have gradually become nothing but black floating masses, which, in the words of the President of the Society of British Architects, are "miracles of ugliness."* The armoured portion of the "Warrior" is 213 feet in length, the ends of the vessel being entirely unprotected. The next grade or class of armoured clads commenced with the "Hector"; the main deck was protected throughout its entire length, but the vital parts of the ends were as unprotected as in the "Warrior." Next came the "Minataur" class, vessels of 400 feet

* Sixth Lecture at Royal Academy, 1879.

in length, and 59 feet 4⅛ inches beam, with 5½-inch armour, and 10-inch teak backing. Then the converted line-of-battle ship, like the "Caledonia," 273 feet long, by 58 feet 6 inches beam. In these vessels the whole of the side, to 6 feet below the water-line, was protected with armour. Other classes were represented by the "Enterprise" and the "Bellerophon," which had a complete belt of armour above and below the water-line, but without any gun-deck armour at the ends. This plan was known as the "central battery and armour-belt system." The "Bellerophon," with 6-inch armour and 10-inch of teak backing, was also a short ship with increased beam, her length 300 feet, and beam 56 feet 1 inch; her designer, Mr. E. J. Reed, M.P., C.B., F.R.S., the then Chief Constructor of the Navy, claimed the honour of having produced a more economical vessel, in many respects, than in the older system. In the "Invincible" class, the armour-plating is continued up sufficiently high amidships, so as to protect four heavy guns in an octagonal battery. The French have largely adopted this last system. The turret *versus* the broadside system occasioned a considerable amount of controversy, especially as regards the rigged turret-ship, and its efficiency towards obtaining an all-round fire with its guns. The "Monarch" and the "Captain" were rigged turret vessels, but the two were of very different design, the former having a high side, and being a very seaworthy vessel. The latter unfortunately having a low freeboard, and a small range of stability; this, combined

leaving a much larger margin for armour, guns, and coals, as compared with a hull constructed of timber. Of the double-bottom or cellular system, mention has already been made, as well as of the water-tight compartments. H.M.S. "Bellerophon" was the first built on what is called the bracket-frame system, viz., longitudinal stringers of greater width connected to the skin by bracket-frames, instead of small solid transverse girders, as in the "Warrior." This system, while giving greater strength, saved considerably in weight, thereby meeting the two great objects required in construction. Mr. E. J. Reed, C.B., stated, in the House of Commons, in 1874, "That for every £100 which we had to invest in "ships in the old days, we had now to invest £170, "in order to carry the same number of men to sea."

The fastest wooden line-of-battle ships never exceeded 13 knots; the speed of iron-clads has reached 15 knots. From 1859 to 1869 the expenditure of the British navy amounted to £116,800,000, out of which £10,000,000 was expended in building and equipping iron-clads.

The guns used in the navy, before the time of building H.M.S. "Warrior," were 68-pounders, weighing 95 cwt., with a charge of 16 lbs.; 8-inch guns, weighing 58 cwt., and 32-pounders, weighing from 42 cwt. to 58 cwt. The "Warrior's" armament consisted entirely of 68-pounders. The next step was the manufacture of a 6½-ton gun, which could pierce the "Warrior's" side at 500 yards; then a 12½-ton 250-pounder gun, with a charge of

43 lbs., that would do the same at 2,000 yards. In rapid succession followed an 18-ton 400-pounder gun, charge 60 lbs.; then a 25-ton, throwing a shot of 600 lbs., charge 70 lbs.; a 30-ton, or "Woolwich Infant," as it was called, carrying a shot of 600 lbs., with a charge of 100 lbs.; 35 and 38-ton guns, as carried by the "Thunderer" and "Devastation." The latest additions to the British navy will carry 80 to 84-ton guns. The largest guns made, viz., 100-tons, have been manufactured by Sir W. Armstrong and Company, for the Italian armour-clads, "Dandolo" and "Duilio," being each armed with four. They are 30 feet long, and have a calibre of 17 to 19 inches, with a charge up to 430 lbs.; they carry a shot of 2,000 lbs., with a velocity of 1,600 feet per second. These guns are now being supplied for experiment to the British Government. The muzzle-loading system has been adopted in the British navy for all heavy guns; whereas breech-loaders are in favour with the Germans. This question, "muzzle *versus* breech-loading," is again to be opened up from its commencement, in consequence of a disaster with one of the "Thunderer's" 38-ton guns. The Americans have, until recently, kept to a large cast-iron gun, throwing a spherical shot, up to 25 inches diameter. They prefer a slow battering shot; whereas the rifled-gun sends forth, with a high velocity, a punching elongated shot. The American Gatling gun, which keeps up a continuous fire from its many barrels, is now carried in most of the British ships

of war, principally as a protection against boarders and torpedo boats. The armament of the British navy was, until June 1866, fixed by the War Department an anomaly difficult to account for: that military men of all grades should have almost the entire say of what was the proper equipment for men of war.

The increased size of artillery, the vulnerability of existing iron-clads, and the conflict of opinion as to whether the new un-masted iron-clad was a good substitute for the rigged one, led to the appointment, in 1871, of a "Committee on Naval Designs." H.M.S. "Inflexible" was the outcome of their deliberations—a rigged twin-screw double-turret ship, with a central armoured citadel, designed by Mr. N. Barnaby, C.B., Director of Naval Construction. The length is 320 feet; breadth, 75 feet; depth of hold, 23 feet 3½ inches; freeboard, 10 feet; mean draught, 24 feet 5 inches; area of midship section, 1,658 square feet; displacement at her full draught, 11,407 tons; she is divided into 135 water-tight compartments; weight of side and deck armour, 3,155 tons; turret-armour being 18 inches in one thickness; the sides of the citadel, which enclose the turrets, being protected with 12-inch armour; at the water-line is another thickness of 12-inch armour; the vessel thus being protected with a double arrangement of armour, which is reduced in thickness below the water-line; with armour and its teak backings, a wall 41 inches thick is formed. The two turrets are not over the centre line of the vessel, but are placed one on each side,

or *en echelon*. This enables her four guns to be fired together right ahead or astern. Her guns will be 81 ton, of a calibre of 16 inches, and, with a charge of 300 lbs., will send a shot of 1,650 lbs. through the armour of the "Devastation." The turrets are rotated by hydraulic machinery; the guns are also intended to be worked by the same means as had already been adopted in H.M.S. "Thunderer." The engines were manufactured by John Elder and Company, of Glasgow, of the nominal horse-power of 1,000. At the trial-trip, 13th November, 1878, they worked up to 8,535.47 horse-power, the contract having only stipulated for 8,000; and the vessel's speed at the measured mile was 14¾ knots. There are three cylinders in each set of engines, viz., a high-pressure cylinder, 70 inches in diameter, and two low-pressure cylinders, 90 inches in diameter; stroke, 4 feet. Steam is supplied from 12 boilers. The cost of the engines and gear was £100,150, and of the boilers £20,600. There are, altogether, 39 engines on board, required for multifarious purposes.

The hull of the "Inflexible" weighs 7,300 tons; and the cost was estimated as follows: materials, £269,000; labour, £132,000; total, £401,000; but it has already arrived at something over £600,000, including equipments. To give anything like a full account of this remarkable vessel would occupy many pages. She is considered to be a triumph in naval shipbuilding, from the immense amount of ingenuity displayed in every part of her construction. On account of the peculiar form and construction of

this iron-clad (the unarmoured ends of the vessel being subdivided into many compartments, with a thickness of 4 feet of cork, and then 2 feet of canvas and oakum to give buoyancy), the question arose, whether, in case these ends were shot through, the vessel would retain sufficient stability. This gave rise to a considerable amount of adverse criticism in 1877, the most searching and powerful part of the same appearing in the columns of the "Times." Mr. E. J. Reed, C.B., F.R.S., M.P., also cast much doubt on her capabilities. After being defended and discussed in the House of Commons, the questions in point were remitted to a committee, consisting of Admiral Hope, C.B., Dr. Woolley, Mr. G. W. Rendel, C.E., and Mr. Froude, C.E., for thorough investigation. The result was, that they considered the "Inflexible's" stability safe, as regards the destruction of the ends from shell fire. Their report raised many points, interesting to the marine engineer and naval architect—her great breadth, displacement, power, and speed, taken together, give much matter for study and comment.

CHAPTER XIV.

THE latest trials (July 1879), to decide on the best turret armour for H.M.S. "Inflexible," have resulted in the compound armour-plate coming out of a very trying ordeal, with the most favourable results. This compound system consists in having a rolled plate, half of its thickness being iron, the remainder of steel—forming a hard, shot-resisting face. The plate tested was a portion of one originally 22 feet in length by 8 feet, manufactured by Messrs. Cammell and Company, of Sheffield, and rolled down till there was a thickness of $3\frac{1}{2}$ inches of steel upon $5\frac{1}{2}$ inches of iron. The total thickness being just half of what the original turret armour was to have been, thereby making a considerable saving in weight. Three shots were fired at the plate, which was 8 feet 4 inches by 6 feet broad, at a range of 30 feet, from a 12-ton 9-inch gun, the charge being 50 lbs., and the projectile, a Palliser chilled shot, weighing 250 lbs. The shots were completely broken up, and none of the fine cracks extended to the iron backing.

A steel twin-screw double-turreted ship, to be called the "Colossus," has just been commenced at

steel torpedo ram, to be called the "Polyphemus"; dimensions: 240 feet between perpendiculars, 40 feet extreme breadth, with a load draft of 20 feet, and a displacement of 2,640 tons. The design is novel, the small part above water being convex, and her midship section closely resembling a peg-top. Her frames are of Bessemer steel, and the bottom plating of Siemens-Martin steel, from the Landore works. She will be propelled by twin-screws, and two pair of high-pressure compound horizontal engines by Messrs. Humphrey and Tennant. High-pressure cylinders will be 38 inches in diameter, and the low-pressure 64 inches, stroke 45 inches. The boilers will be of the locomotive type, twelve in number, and will be of steel. With a pressure of 110 lbs. per square inch, it is estimated that the collective-power of the engines will be 5,500 horses, and the speed of the ship will be 17 knots. It will not be here out of place to mention the "Whitehead Fish" torpedo, which is a sub-marine vessel, containing machinery driven by compressed air; and its initial speed of 20 miles per hour. This torpedo is ejected under water from a tube now fitted to most iron-clads.

There have been but two real fights between iron-clads. Between the "Monitor" and the "Merrimac"; and that at the battle of Lissa, when the Austrian vessel, "Ferdinand Max," rammed and and sunk the Italian iron-clad "Ré d'Italia." The fight between H.M.S. "Shah" and the Peruvian iron-clad "Huascar," was not of much importance. If the latter had been ably handled, it would have

been a serious business for the corvette. Iron-clads, thus far, have done more damage to their friends, than to their foes; and, by way, as it would seem, of a little practice, the fine iron-clads "Vanguard" and "Grosser-Kurfürst," have been sent to the bottom through being rammed by their consorts. It appears that ramming is more to be dreaded in an engagement than either artillery or torpedoes, as it can be delivered with greater certainty.

The Royal National Life-boat Institution of Great Britain was established in 1824, an Institution which, for true nobility and disinterestedness as regards emolument, is second to none in the world; and, as it was stated, in the opening of this small work, that, as there was no other branch of science and art combined that had benefited the world so much as shipping; so it may now be said, that the Royal Life-boat Institution crowns the whole. The medium size of their boats is about 30 feet in length, with 10 oars double-banked; some boats are from 40 to 45 feet long, and weigh from 4 to 5 tons.

As one of the ideas which prompted the writing of this sketch was, to be instructive to youth, it will form a suitable conclusion to touch upon the education of the naval architect. At the present time, the profession has assumed a recognised status, only arrived at within the last few years, and may be said to date from the foundation of the Institution of Naval Architects in 1860. The introduction of armoured vessels gave a great stimulus to the bringing together of a large amount of scientific and

practical knowledge, which the Institution has generally diffused.

The opportunities and incentives now offering for any youth wishing to adopt one of the noblest of professions are great, and can now be accomplished without a great outlay of money. Scientific training, to go hand in hand with practical experience of the workshop, may now be had at the Owen's College, Manchester, which Institution is to be nucleus for the new Victoria University. Scholarships given by Sir Joseph Whitworth, Bart., in connection with the Science and Art Department, South Kensington. The "Whitworth Scholarships" were instituted in October 1869, consisting of 30 scholarships, of £100 a year each, tenable for two or three years, for the encouragement of mechanical and engineering science. The Royal Naval College and its Museum, at Greenwich, which is the outcome of the Royal Naval School at South Kensington, has terms for three years' study, and offers two scholarships of £50 each, given by the Admiralty and the Committee of Lloyd's Registry respectively. It will be seen that, from these Institutions alone, the proper training for a naval architect can be obtained. Before their establishment (with the exception of a few leading men, principally in government service), there were no means for getting an insight into the scientific elements which entered into the structure of a ship. "A Manual of Naval Architecture," by Mr. W. H. White, Instructor in Naval Architecture, Royal Naval College, is a most valuable work, and

at once directs the student to the leading points for consideration and study. Eton has now its school of mechanics, with a factory fitted with machinery. There is also at the University of Cambridge a workshop, fitted with a Whitworth lathe and other tools. An instrument maker, a fitter, and a cabinet-maker is also attached to the workshop. The whole being under the superintendence of the Professor of Mechanism and applied mechanics. The Crystal Palace School of Practical Engineering is doing useful work, and has lately given to students the benefit of a sea trip; they taking it in turn to manage the engines. Sir Josiah Mason's splendid Science College, Birmingham, will soon be open. By the mention of these learned Institutions, it will be seen what great advantages the student of the present day has. Other countries have been, for a long time back, more advanced in technical and other education than Great Britain. The Institute of Technology, Boston, U.S.A., is a model in its way.

There is one point that must be mentioned, viz., that, while receiving a scientific education for an engineer, a shipbuilder, and naval architect, a thorough practical knowledge of the workshop must not take a second place. To give too much prominence to abstruse mathematical problems, so as to be "lost in figures," will surely occupy valuable time, which ought to be given to close study of details of construction—one of the chief causes of Great Britain's proud position in the engineering

world. As before mentioned, this position has been obtained by experience, based on failures, which have, in many instances, brought to light the want of a combination of scientific with practical knowledge. A melancholy instance of this was the loss of H.M.S. "Captain," on the 6th September, 1870; and, at the present time, the failure of one of the 38-ton guns of H.M.S. "Thunderer," which involves the re-organizing of the "Committee on Ordnance," to open up an investigation on heavy guns, from the old 68-pounder, of 95 cwt., to the 100-ton gun, carrying a shot of 2,000 lbs.

If there be one thing more than another in the scale of daily life, that will, in the future, conduce to our prosperity, and help us to hold our own against the rising competition of nations, and consequent gradual lessening of our wealth, it will be our shipping, as has been proved. Scientific economy in ships and engines, with constant striving after improvement, will, with God's good help, enable us to maintain our pre-eminence as a nation, of which we are so justly proud.

In conclusion, a paragraph may be quoted from a work,* written by Henry Brooke, about one hundred years ago, foreshadowing Great Britain's present position: "The Seven United Provinces do not "contain land sufficient for the subsistence of one-"third of their inhabitants; but they are a nation "of merchants; the world furnishes them with an "abundance of all good things; by commerce they

* "The Fool of Quality," by Henry Brooke, pp. 26, 27.

" have arrived at empire; they have assumed to
" themselves the principality of the ocean; and, by
" being lords of the ocean, are in a measure become
" the proprietors of all lands. Should England ever
" open her eyes to her own interests, she will follow
" the same prosperous and ennobling profession;
" she will conform to the consequences of her situa-
" tion; she will see that, without a naval pre-
" eminence, she cannot be safe; and that, without
" trade, her naval force cannot be supported. Her
" glory will also flow from this source of her in-
" terests, and a sail-yard will become the highest
" sceptre of her dignity. She will then find that a
" single triumph of her flag will be more available
" for her prosperity than the conquests of the four
" continents; that her pre-eminence by sea will
" carry and diffuse her influence over all lands; and
" that universal influence is universal dominion."

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